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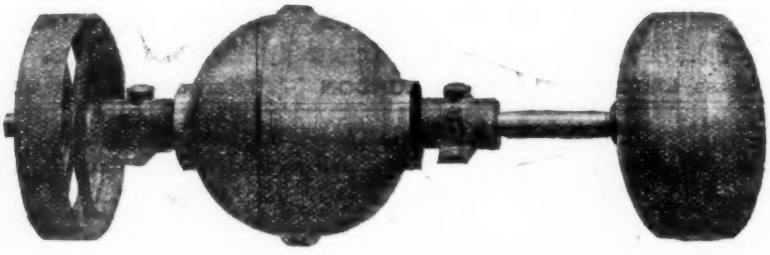

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A Lecture

ON THE

TREATMENT OF WAR WOUNDS.*

SUPPLEMENTED BY ADDITIONAL MATTER RELATING TO ANTISEPTICS AND THE METHOD OF CARREL.

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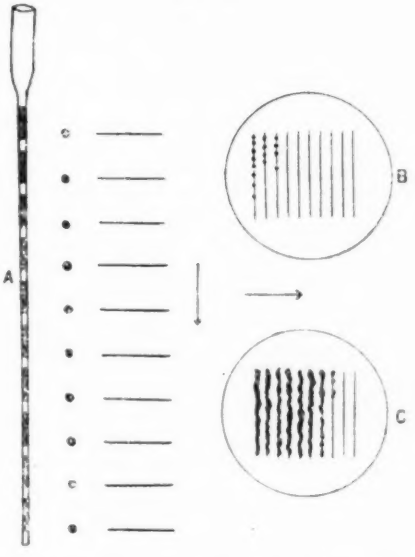
WE are wont to classify the patients in our military hospitals into sick and wounded. In reality all, or nearly all, are suffering from bacterial infections. And the essential difference between the sick and the wounded lies in this, that the sick are suffering from infections spontaneously contracted, the wounded from infections induced by mechanical injuries. My theme is the treatment of this latter class of infections. They are distinguished by certain quite special features.

In spontaneous infection we have to deal with microbes which have fought their way into the body, and generally only a single species of microbe will have done this. In wounds we have microbes mechanically driven in, and every sort of microbe which exists in external nature may thus be introduced.

Furthermore, the disposition of the microbes in war wounds is fundamentally different from that in ordinary surgical wounds. In war wounds the infection is disposed in part upon lacerated raw surfaces; and in part it is carried deep into the substance of the tissues. Moreover, the infected lacerated surfaces are left denuded of skin and exposed to injurious external influences; and the infection which is carried down into the tissues is left as a buried infection. Now there is in ordinary surgical operations nothing at all comparable to this. The surgeon never leaves cut surfaces naked and exposed, or a buried focus of infection unopened.

FIG. 1.



Method of pyo-sero-culture.—A, Pipette which has been implanted by the wet-wall method, and has then been filled in by the wash and after-wash procedure with unit volumes of serum. By the side of the pipette to the right are ranged a series of drops representing the series of unit volumes of serum blown out in order from the pipette, and, finally, to the right of the drops are a series of lines representing linear implantations made upon agar. B, Results of the series of linear implantations made with the unit volumes of the patient's serum. C, Results of the series of linear implantations made with the unit volumes of the normal serum which was used as a control.

* In its original form this lecture was delivered at the Royal Institution on March 9th, 1917.

This will have brought it home to you how especially difficult are the conditions which have to be dealt with in the infected war wound. But let me before embarking upon the question of their treatment, first tell you something about the natural agencies by which the inroads of microbes are combated. You are, of course, aware that we are guarded against microbic infection by our blood fluids and our white blood corpuscles.

THE BODY FLUIDS.

Let me begin with the blood fluids, and let me take you directly to the following experiment. I call it the experiment of *pyo-sero-culture*—i.e., the experiment in which we implant pus into serum to see which of the microbes of the wound can grow in the blood fluids.

We procure for our experiment a suppurating wound. We take from it a specimen of pus containing a large variety of different organisms. At the same time we take from the patient's finger a sample of blood; and we take a specimen also of our own. When the serum has issued from the clot we take a capillary pipette, fit a rubber teat to the barrel, and inscribe a mark upon the stem at about say one-third of an inch from the tip. We now aspirate a little pus into the stem, drawing it up only as far as our fiducial mark, and blowing it out again leave a wash of pus upon the walls. This done, we sterilise the tip of the pipette, and then aspirate into the stem a series of unit-volumes of serum, dividing each volume off from the next by a bubble of air. The pipette when filled in this manner presents the appearance shown in Fig. 1; and we have now in the proximal end our first and heaviest implantation of pus, and in the distal end our last and lightest implantation. The pipette is after this placed in the incubator to allow every microbe which is capable of growing in serum to do so. After an interval of six or more hours we proceed to our examination. What we do is to blow out our series of unit-volumes of serum in separate drops and examine under the microscope; or, better, we plant out a sample of each drop upon a separate seed-bed. Here in B and C you have the results of such culture represented diagrammatically—the meagre crop in B being that obtained with the patient's serum and the more copious crop in C being that obtained with normal serum.

FIG. 2.

A portion of a pyo-sero-culture planted out upon an agar slant divided up by furrows into a series of seed beds.

And you have in the next figure (Fig. 2) a drawing of an agar tube implanted from a pyo-sero-culture made with the serum of a wounded man. In the upper part of the agar tube you see two seed-plots implanted from the distal portion of the capillary stem. These have remained sterile. In the middle of the tube you see three plots implanted from the unit-volumes of serum which occupied the middle region of the capillary stem. These have grown colonies of only one species of microbe—the streptococcus. At the bottom of the tube you see seed-plots implanted from the proximal end of the capillary stem. These are over-grown with colonies of staphylococcus. But no doubt interspersed with and overgrown by these are also colonies of streptococci. If instead of cultures from the patient's serum, I had been showing you here cultures from normal serum, what you would have seen would have been a much larger number of fertile seed-plots, and the seed-plots implanted from the proximal end of the pipette would have shown a large assortment of different colonies.

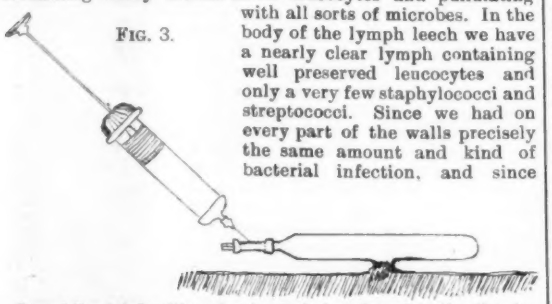
We learn from such experiments three lessons: *first*, that in the uncorrupted serum in the distal region of the pipette only two species of microbes from the wound can grow and multiply; *secondly*, that in the corrupted serum in the proximal end of the pipette all the microbes of the wound can grow; and, *thirdly*, we learn from a comparison of the

wounded man's serum with the normal serum that the former offers more resistance to microbic growth, and is less easily corrupted by the addition of pus.

Cause of the Corruption of the Serum.

Experiments of this kind clearly do not tell us the cause of the corruption of the serum. It may be due to some chemical addition to the serum or to something special in the character of the bacterial implantations. This point we can clear up as follows. We go back to our very septic wound. We clean it out carefully by syringing. That leaves us with a wound cavity clean but still abundantly infected. We then take the little cupping apparatus which is shown in Fig. 3. We apply it to the walls of the wound, using light pressure. Then, puncturing the attached rubber tube with the needle of a hypodermic syringe, we withdraw the contained air, and leave our lymph leech *in situ* adhering by negative pressure till the time for redressing the wound comes round. When we now go back to our wound we find there two quite different discharges. We have in the general cavity of the wound a thick pus containing many broken-down leucocytes and pullulating with all sorts of microbes. In the body of the lymph leech we have a nearly clear lymph containing well preserved leucocytes and only a very few staphylococci and streptococci. Since we had on every part of the walls precisely the same amount and kind of bacterial infection, and since we are in each case dealing with the self-same lymph and leucocytes, this difference of results would seem to be due to our having in the lymph leech, owing to the negative pressure employed, a larger proportion of blood fluids.

FIG. 3.



Lymph leech in position, showing technique for exhausting the air.

But with this the problem is, as you see, only incompletely resolved. We have learned that the corruption of the discharges is not determined by the nature of the bacterial implantation; we have reason to think it is hindered by a larger afflux of lymph; and it looks as if it might have something to do with the breaking down of the leucocytes, but we have not yet put our finger upon the particular element that takes away from the serum its power of inhibiting microbic growth, converting it into a congenial pabulum for all manner of micro-organisms.

Let me in this connexion invite you to consider, for that may perhaps put us on the path for the solution of our problem, a scheme of classification of the albuminous substances. I would propose to classify them from the point of view of their capacity to furnish pabulum for microbes, and to distinguish three classes of albuminous substances. First, would come *digested albumens*. It is a familiar matter that these furnish very congenial pabulum for microbes. In the form of peptone we use them for all our artificial cultures. A second category of albumens would be *native albumens*. Muscle, milk, and eggs furnish such albumens. These are not like digested albumens, directly assimilable. Before they can be assimilated, either by ourselves or by microbes, they must be broken down into simpler elements by digestion. We ourselves, and a certain number of microbes also, are furnished with digestive ferments which convert native albumens into pabulum. There is yet a third class of albumens. I would venture to call these *defended* or *protected albumens*. These cannot, like the digested albumens, be directly assimilated. Nor can they, like the native albumens, be directly digested. They are specially defended against the attack of digestive ferments. The albumens of the serum may be ranged in this class of "defended albumens." It is well known with respect to serum that it has a power of neutralising digestive ferments,[1] and we express that fact by saying that the serum has an antizymotic, and in particular an antitryptic, power. You will, perhaps, not immediately perceive that the fact that the serum is antitryptic in any way elucidates our problem. But let us take that fact and put it in another way and then consider. Let us, instead of saying that the serum has an antitryptic property, say that it has a power of preventing its constituent albumens being converted into pabulum for microbes, and immediately, as I think, light is projected upon our problem. For once we envisage the facts in that way we are immediately impelled to inquire whether the serum's power of inhibiting bacterial growth may not be due to its power of neutralising digestive ferments, and whether the corruption of the lymph in the cavity of the wound may not be due to a collapse of its defence against proteolytic attack.

That is a point which is very easily settled by direct experiment. And let me now show you what happens when we add trypsin to a serum which has been implanted with microbes. I have here two tubes of a serum implanted two days ago with a minute quantity of pus containing a variety of different microbes. To the one I added trypsin, the quantity added being less than that required to neutralise its antitryptic power. The other tube of the implanted serum served as a control. Both tubes were then placed in the incubator. And you see the difference. The trypsinised serum is turbid with microbic growth. That is, we have here exactly the same result as that obtained in the sero-pyo-culture experiment in those volumes of serum which were heavily implanted with pus; and the same result also as was in the lymph leech experiment obtained in the pus of the wound cavity. Our control serum has, as you see, remained almost perfectly clear. That is the same result as was obtained in the sero-pyo-culture experiment with our lightly implanted serum, and again in our lymph leech experiment in the cavity of the lymph leech.

All this, as you see, points to the corruption of the blood fluids being due to a loss of antitryptic power. This view wins further support from the following facts: 1. There is in every suppurating wound, as we shall presently see, a source from which trypsin can be derived. 2. Blood fluids which inhibit microbic growth are strongly antitryptic; and blood fluids which we find teeming with microbes are tryptic. 3. We have in the blood of every wounded man a markedly increased antitryptic power (you saw in our pyo-sero-culture experiment what results from this); and in the blood of heavily wounded men on an average a three- or four-fold increased antitryptic power. That clearly teaches that the body when endangered takes steps to protect itself non-specifically against all microbic infections of the blood fluids.

THE LEUCOCYTES.

I now pass on to consider the leucocytes and the part they play in the destruction of microbes. You already know with respect to leucocytes that they can emerge from the blood-vessels, burrowing their way out through small pores in the capillary walls; that they make their way to every focus of infection; that they ingest microbes when these have first been prepared by the action of the blood fluids; and, finally, you know that the leucocytes can, if things go favourably, digest and dissolve the ingested microbes. There would by consequence in connexion with the leucocyte be three functions to study. First would come emigration, then phagocytosis, and then intracellular digestion. Emigration has up to the present been studied only in the interior of the organism. You will realise that means that it has been studied only in difficult setting and in the presence of all sorts of disturbing factors, and you will appreciate that we want now a new and better technique. For we require for the treatment of the infected wound to find out how best to call out the leucocytes; and how, when occasion requires, to restrain their emigration.

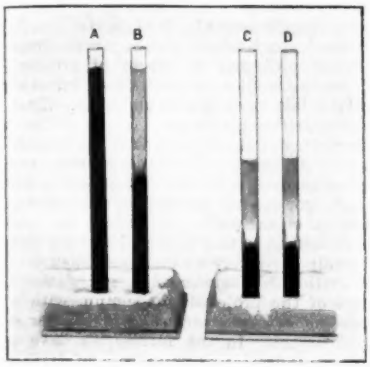
I have in connexion with this a technique to describe to you, but first I want you to appreciate what we can and what we cannot expect from leucocytes in the matter of locomotion. Leucocytes can, we know, make their way out through small openings. They can also travel over any ordinary surface. They can edge their way along faster when lightly compressed between two surfaces. They can crawl along strands, creep through a meshwork, and climb a scaffolding. But they are unable to climb a vertical glass wall. And again, they are unable to swim, and so once they

[1] Let me here incidentally call attention to the fact that the application of horse serum will prevent and very effectually relieve the digestive erosion of the skin which is in enterostomy of the upper part of the small intestine produced by the outflow of pancreatic juice.

get into open fluid they simply go to the bottom. If we are anxious to find something to which we may compare them we may liken them to very minute slugs crawling along surfaces and climbing trellises, but brought up short by any considerable barrier of fluid.

All these points must be considered if we want to arrive at a technique for the experimental study of emigration, using for the study of emigration specimens of blood withdrawn from the body. The containing blood vessel can in certain respects be imitated by a glass tube, and we can, to facilitate observation, use tubes drawn out flat, such as shown in Fig. 4. But our artificial capillary differs from the natural one in having impermeable instead of permeable walls. This, of course, makes emigration through the walls impossible. None the less, we can in these tubes study emigration. We can institute races for leucocytes along the length.

FIG. 4.



Drawing of four flattened capillary tubes—A, filled in with blood; B, a similar tube after centrifugalisation showing above the "white" and below the "red clot"; C and D, similar tubes after incubation. Leucocytic emigration visible to the naked eye as opaque white bands occupying the lower portion of the white clots. In D, where physiological salt solution had been imposed upon the white clot, the band of emigration is much broader than in C.

But first certain preparations must be made. The course must be cleared of all obstructions—i.e., the red corpuscles must be got out of the way. Next the leucocytes must all be brought back behind the scratch line, and we must provide a scaffolding for the leucocytes to climb. This can all be arranged. We fill in our flat emigration tubes with blood and seal them at one end. We then, by centrifuging, bring the blood fluids to the top and the corpuscles to the bottom. The lighter leucocytes will now have arranged themselves in a layer immediately above the red, and presently the supernatant fluid will clot and the meshwork of fibrin will then provide the scaffolding we require. We can now impose upon the clot—let me for convenience call it the white clot—any chemical agent we please and let it slowly diffuse down towards the leucocytes; or if we want to study the effect of bacterial infection, we can introduce microbes into the blood before we fill it into the tube, or as an alternative fill our blood into tubes whose walls have been implanted with microbes. Finally, we set our experiment going by placing our emigration tubes in the incubator—that is, we supply to our leucocytes the necessary warmth. And we can at any moment take stock of what is occurring in our tubes by examining with the naked-eye or with the low power of the microscope through the walls. Also by a very simple technique we can extract the clot from the tube and mount and colour it, so as to bring everything clearly into view under the high powers of the microscope.

Emigration of Leucocytes: Facts with Practical Application.

I must limit myself to showing you in connexion with emigration a few outstanding facts which have a practical application to the treatment of wounds. Let me begin with the naked-eye appearances. We have in Fig. 4, C and D, emigration tubes containing centrifuged blood which have been in the incubator for about eight hours. In C—the control tube—we have centrifuged blood to which no addition has been made. In D some weak salt solution has been imposed upon the white clot. The emigrating leucocytes are visible to the eye in the form of a slightly opaque white band extending upwards from the red into the white clot. You see that in D the corpuscles have climbed higher than in C.

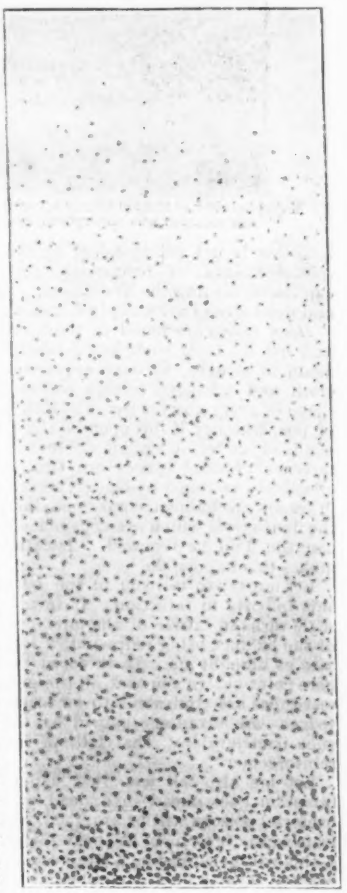
Fig. 5 shows what such a band of emigrating leucocytes looks like under the microscope. Instead of the leucocytes being all, as you will see in the next, congregated together behind the starting line, they here are actively emigrating, the more active out-distancing the others in the race.

Fig. 6 shows what happens when 5 per cent. salt solution is imposed upon the blood. That salt passes down by diffusion and arrests emigration, and I want you to notice in the one corner of the figure (and more clearly in the inset) that the few white corpuscles which were beginning to emigrate when the salt solution overtook them are broken up and destroyed. We shall presently appreciate the significance of that fact.

I next show you what happens when microbes have been implanted into the blood. Those microbes—supposing always that they are the sort that can proliferate in blood—grow out into colonies. In Fig. 7 is shown what happens when an excessive implantation has been made, and the bacterial colonies come up very thickly in the blood. You see here that emigration is entirely arrested. If that were to happen in infected tissues it would mean that the organism was there giving up the combat against the microbes.

In Fig. 8 we have again streptococcus implanted into the blood, but this time it is a much more sparing implantation. And here, as you see, the leucocytes are carrying out a raid against the microbes, each leucocyte ingesting and filling itself full with microbes.

FIG. 5.



Magnified view of the band of leucocytic emigration seen in Fig. 4, D.

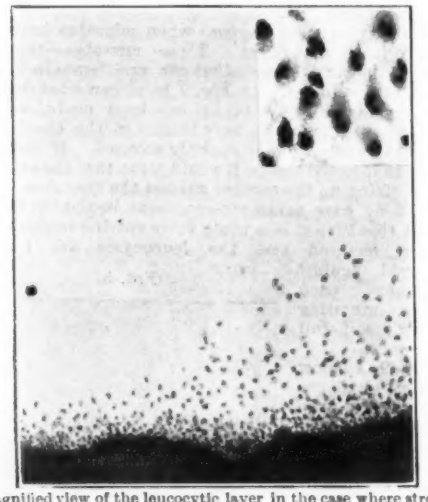
In Fig. 9 I show you what happens when we make into the blood a very heavy implantation of the gangrene bacillus. Here in the neighbourhood of the leucocytic layer things are for the moment going well for the leucocytes, for they are actively phagocyting. But farther away from that layer there are very numerous colonies of the gangrene bacillus, which are growing unimpeded. The omens are consequently unfavourable. You can see in your mind's eye what is going to happen. In the first place, all further emigration of leucocytes is going to be arrested. And, in the second place, the leucocytes which have already emigrated and ingested microbes will, instead of successfully digesting them, be gradually poisoned by bacterial toxins. And when the leucocytes are killed, their digestive ferment—you will remember my telling you that it would shortly appear that trypsin was at hand in every wound—passes out into the serum. By that, the serum will, as we have seen, be converted into a medium in which microbes can grow and pullulate.

DISTINCTION BETWEEN "LIVE" AND "DEAD" SPACES.

But we must now come back from these general questions to that of the treatment of the wound. Let me begin by explaining to you—for important questions of treatment hinge upon this—the distinction between "*live spaces*" and "*dead spaces*."

In the lacunæ of vascularised tissues we have *live spaces*. In these we have optimum conditions for resistance to bacterial infection. We have here an antibacterial lymph; and this is continuously secreted and moved along so that all corruptive changes would be continuously antagonised and remedied. Again, we have in live spaces ground that can be effectively searched by leucocytes, and if the bacterial

FIG. 6.



Magnified view of the leucocytic layer in the case where strong salt solution was superposed upon the white clot.

infection is not extinguished by the first leucocytic attack reinforcements of leucocytes can be supplied by the capillaries feeding the live spaces. In all these respects live and dead spaces are sharply contrasted.

Dead spaces are found in tissues which have been bruised and cut off from their blood-supply. We encounter them again in sloughs, in bone sequestra, and in the texture of cloth and intrusive foreign bodies. And we have a dead space in every abscess sac, and also in every other collection of pus, whether it lies open in the pocket of a wound or is confined under a slough or scab. The essential characteristics of dead spaces are two. First, they cannot be effectively searched by leucocytes. In some cases chemical, in others mechanical, conditions stand in the way. Secondly, the leucocytes which are engaged cannot be reinforced, nor can the fluid be renewed. Isolation from the circulation makes this impossible.

Let me try to tell you in the fewest possible words what this imports in infection. If in an infected live space the scale turns in favour of the microbes, there is still a chance of the balance being redressed. Reinforcements can at any rate be brought up. In infected dead spaces—and let me here point out to you that all the experiments we conduct in test-tubes are equivalent to experiments conducted in dead spaces—an advantage gained by the microbes becomes at once irretrievable. That follows from the impossibility of reinforcement.

Let me also tell you what happens to the patient when infection goes ahead in a dead space. In the first place bacterial poisons will be absorbed, and the patient will suffer from septic fever. In the next place the microbic infection—this will generally be a streptococcic infection, but in war wounds it may be a gangrene-bacillus infection—will very often invade the surrounding tissues and from thence the blood-stream. And in the third place, the pus in the dead space will, when it becomes tryptic, eat its way into the enclosing tissues. The abscess sac will then extend in all dimensions, or else the pus will burrow in the direction of least resistance until it opens upon an inner or an outer surface.

TREATMENT OF WOUND INFECTIONS.

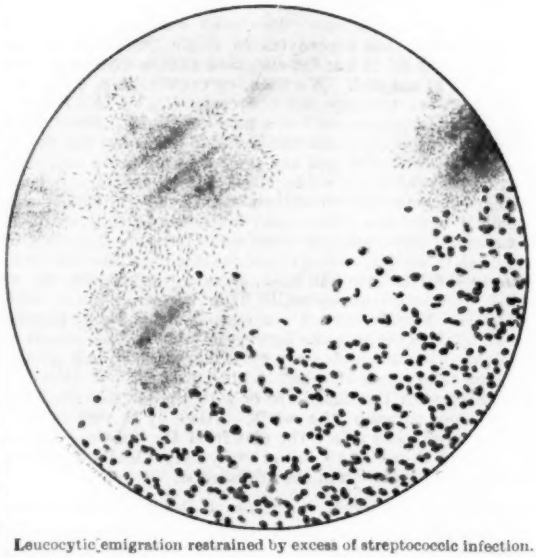
If you have now quite clearly apprehended the significant distinction between a live space and a dead space, you will with that have mastered the first great principle governing the treatment of all local bacterial infections. If you are dealing with infection in live spaces you can often mend matters by bringing (that is the rationale of hot fomentations) more blood—that means more lymph and more leucocytes to the focus of infection; and again you can often mend matters by improving the quality of the lymph—that is the rationale of vaccine therapy; or, again, you may apply both these procedures concurrently. But when you are dealing with an infected dead space you cannot in these ways mend matters. You might just as well try to influence a test-tubeful of infected fluid. Where you have infected dead spaces, your only remedy is the knife. You have to evacuate your dead space as I empty this test-tube.

Now that is the whole purpose and meaning of the surgery of the wound as carried out at the front. We can compress that into two propositions. Every infected dead space must be cut down upon and evacuated. And, as a prophylactic measure, every space which would, if left to itself, become an infected dead space—that means every space occupied by an infected projectile or pieces of infected clothing or infected foreign bodies or devitalised infected tissues—must be similarly laid open and cleaned out. That exhausts the treatment of buried infections.

But it is only the beginning of the treatment of the wound. There is still the surface infection. The situation you have to face is just the same as that produced by emptying an infected tube: you have got rid of the infected contents, you have left the infection on the walls.

I now turn to the problem as to how best to deal with this infection. And here again inevitably we must establish distinctions. We must distinguish between the *naked tissue surface* made by the act of the projectile, or section with a knife, and the *granulating defensive surface*, which after a time clothes the naked tissues. In the former we have a non-vascularised surface, and in this a system of lymph spaces left without mechanical or biological protection other than that furnished by the emigration of leucocytes and (till that stanches) by the outflow of lymph. And the naked tissue surface is not only ill defended against microbic attack, it is also peculiarly liable to damage and to physiological deterioration of the kind which opens

FIG. 7.



Leucocytic emigration restrained by excess of streptococcic infection.

the door wider to such attack. Such a surface readily dries up; and drying means the closing down of the capillary circulation. Again, seeing that it is non-vascularised, a naked tissue surface will readily take cold, and by that both lymph outflow and emigration are arrested. And lastly, a naked tissue surface, if kept wet, will as soon as the discharges become tryptic, readily undergo erosive digestion. Against all these forms of physiological degeneration we should in our treatment of naked surface infections make special provision.

A granulating surface offers much greater protection against microbic infection, and is much less subject to damage. The tissues are covered in by many layers of protective cells, the lymph spaces are sealed over, and there has

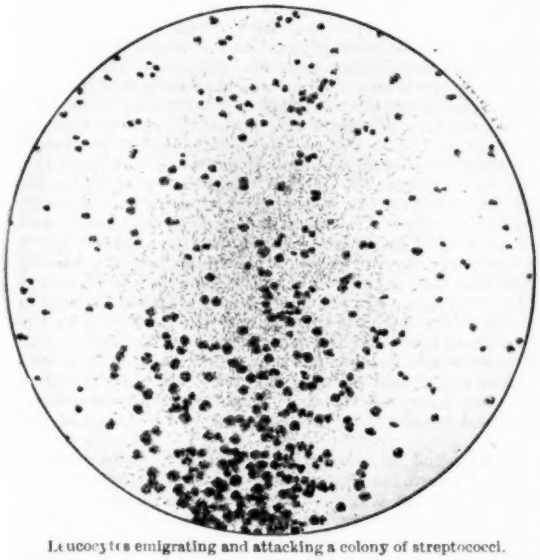
been laid down immediately below the surface in newly formed vessels a very abundant blood supply. All this gives sensible security against massive microbic invasion from the surface; against the wound taking cold; and against erosive digestion. In short, the treatment of the infected granulating surface will be less precarious than that of the infected naked tissue surface.

The Natural History of the Wound with a Naked Tissue Surface Left to Itself.

Let me first consider the natural history of the untreated wound with an infected naked tissue surface. I will take the case of an open shell wound left without treatment. According as it is wet or dry the evolution of this wound will be entirely different. Let us take first the case of its being allowed to dry. Under the original dry dressing the blood and lymph flow from the surface will gradually stanch, and we shall then have a naked tissue surface covered with a coagulated coating of blood and lymph. In this will be incorporated when the tissues have been bruised lacerated elements of moribund tissue, and there will be also included other elements of foreign matter and always a certain number of microbes. Little by little the coating of coagulated blood and lymph upon the surface of the original wound, or, as the case may be, of the surgeon's incisions, will dry up, and the capillary circulation underneath will gradually be closed down by desiccation. And all the while the serophytic microbes will be proliferating. As a result of all this the superficial tissues will die, and become gangrenous, and the originally clean naked tissue-surface will gradually be transformed into a dry, greenish-black, excessively fœtid, slough-covered surface pullulating with microbic growth.[2] Under the sloughs will then be formed infected dead spaces, and from these the infection—I am here thinking in particular of a gangrene infection—will invade the neighbouring live spaces, converting these in their turn into dead spaces until we have large areas of gangrene and a general intoxication.

That, of course, will happen only with very heavy infection or extreme physiological deterioration. With lighter

FIG. 8.



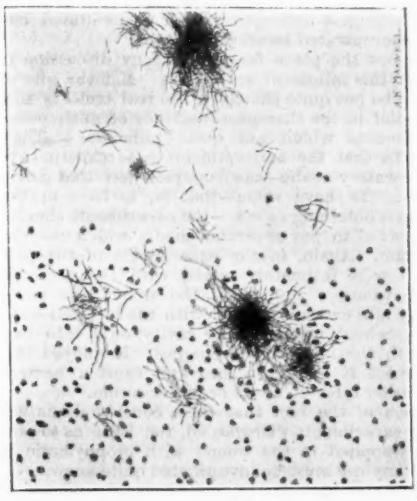
Leucocytes emigrating and attacking a colony of streptococci.

infection or less adverse physiological conditions in the wound, the invaded organism will have recourse to measures of defence. Gradually the superficial sloughs and gangrenous portions of the deeper tissues will be demarcated and then amputated from the living tissues—the amputating agent being, no doubt, the tryptic ferment in the dead spaces. And at the same time there will have been organised in the living tissues some little way back a defensive front built up upon the same plan as a granulating surface.

[2] Let us note in connexion with this microbic growth and factor that the albuminous substances of our tissues which, so long as they are bathed in lymph, rank as protected albumens, are, when the lymph stream dries up, degraded to the rank of unprotected native albumens.

Let me now tell you also what would happen if the infected surface is simply kept wet. Here, also, the microbes which have been incorporated in the clot would grow out. Then there would supervene leucocytic emigration, and upon that would follow a breaking-down of the leucocytes with a setting free of trypsin; and after that any and every microbe would pullulate in the cavity of the

FIG. 9.



Leucocytes emigrating and attacking colonies of the gas gangrene bacillus.

wound and in the devitalised tissues adhering to the surface. Finally, if treatment were still deferred there would be reproduced in an aggravated form (for there would in the open wound be a varied and more formidable infection) the evil train of events which is associated with infection in a buried dead space. When you reflect that an open wound cavity filled out with tryptic pus is physiologically equivalent to an unopened abscess sac, you will see that the same erosive action would be exerted upon its walls; that erosive digestion would enlarge and deepen its cavity; that these degenerative changes would enable the microbic infection to burrow everywhere deeper into the walls; and that bacterial poisons will be absorbed.

All I have been saying in the last few minutes can be compressed into this: an infected naked tissue surface becomes, if allowed to dry, *a desiccated slough-covered wound;* if simply kept wet, *a tryptic suppurating wound.* And the bacteriological events also can be put quite simply. A comparatively light infection, such as we have in the man whose wounds have been properly opened up and mechanically cleaned, is converted by transport into a very heavy infection; and a purely surface infection into an infection invading the deeper tissues.

PROBLEM OF PREVENTING THE DEGENERATION OF THE WOUND WHEN TREATMENT IS INTERRUPTED DURING TRANSPORT.

Having realised what happens to the wound when untreated, we have to think out how to keep wounds—whether originally completely open or opened by a surgeon—from falling during protracted journeys from hospital to hospital into these desperately unwholesome conditions. We have also to consider how to restore, as rapidly as possible, to their original wholesome state wounds which had lapsed into distressing conditions either through lying out untreated on the field or through interruption of treatment during lengthy transport.

Suggestion that the wound could be sterilised at the outset, and could be kept sterile by leaving an antiseptic in the wound.—The first thought of every man would probably be that the wound should be most carefully disinfected at the outset. But what happens in burns shows that to start in the case of an open wound with a sterile surface avails nothing. A burn is a form of wound which is at the outset absolutely sterile, and quite notoriously

it tends to become very rapidly intractably septic. No doubt the germs begin to arrive before the burnt surface has well cooled off, and the wound is very rapidly peopled by microbes. Without doubt this is due to the emigrating leucocytes being held back in the superficial sloughs, disintegrating there and corrupting the exuding lymph. And this is not preventable by any application of antiseptics. The same holds true of war wounds. These become heavily infected even when the wounds are drenched at the outset with the strongest antiseptics, such as undiluted carbolic acid and concentrated solutions of iodine.

This is not the place for any lengthy discussion of the reasons for this failure of antiseptics. But the gist of the matter can be put quite shortly. The real truth is that the current belief in the therapeutic efficacy of antiseptics rests on experiments which are quite fallacious. They are fallacious in that the antiseptic in those experiments was applied in watery media—media which left that antiseptic unaffected. To have value—that is, to have application to conditions obtaining *in vivo*—the experiments should have been conducted in pus or serum—media which quench antiseptic action. Again, in the experiments of the past the antiseptics were intimately mixed with the bacteria suspensions; whereas, applied in the wound the antiseptic comes only into external contact with the infected wall, and when left behind in the empty cavity only into external contact with the inflowing discharges. Employed thus we cannot expect it to diffuse into and exert a bactericidal effect in either infected tissue or pus or serum.

By reason of the fact that these considerations were in the older experiments disregarded, the issue as to whether antiseptics applied in the wound with prophylactic intent can be of any use must be investigated quite anew.

Experimental Investigation of the Efficacy of Antiseptics.

Let me now try to indicate to you what sort of experiments should be undertaken by anyone before nourishing in connexion with a particular antiseptic the expectation that it is going to be efficacious for sterilising and afterwards suppressing microbic growth in wounds. I can illustrate my points best if you let me show you here four tubes.

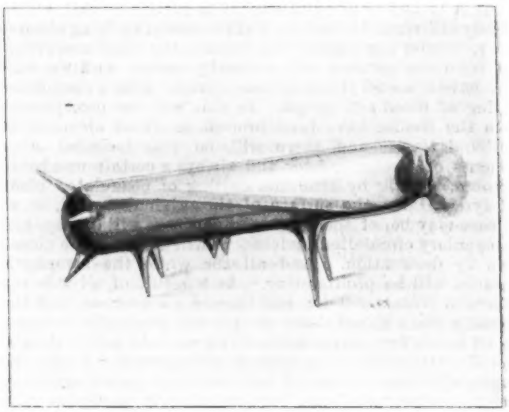
In *Tube No. 1* I have a suspension of microbes in water. I now add an equal volume of the antiseptic I wish to test and shake up thoroughly. These are, as you see, conditions which give every possible advantage to the antiseptic. It is applied in a non-albuminous medium and is intimately mixed with the microbes. To find out whether the microbes have been killed I draw off a sample and dilute with very many times its volume of nutrient medium. I then incubate to see whether I get any bacterial growth.

In *Tube 2* I make the conditions more favourable to the survival of the microbes—infinitely more favourable than if I left behind an antiseptic in a wound. I have here a mixture of staphylococci, streptococci, and gas-gangrene bacilli suspended in serum, and I now, as in Tube 1, add an equal bulk of the antiseptic and shake up, and I then, following the technique of Professor Beattie, pour on a little hot vaseline which will afterwards congeal. This, by forming an air-tight seal, will allow the gangrene bacillus, if it survives, to grow out. It will also by its congealment confine the gas which this microbe evolves, and so will announce its growth.

Tube 3 is, as you see (Fig. 10), a tube which has been drawn out into a number of hollow spikes to imitate the diverticula of the wound. My colleague, Dr. Alexander Fleming, who devised it, calls it the "artificial war wound." To imitate the conditions obtaining in the actual war wound we fill both the tube and its diverticula with an infected trypsinised serum. We now empty the tube, leaving behind of necessity in the diverticula a certain amount of the original infected fluid. We then fill with an antiseptic; and the future of the infection will now depend on the penetrating power of the antiseptic. If the antiseptic penetrates into the infected fluid sterilisation will be obtained; if it fails to penetrate the artificial wound will remain infected. To find out what has happened we empty out the antiseptic, fill in with trypsinised serum, and incubate.

After asking in Tube 3 whether the antiseptic can completely sterilise a wound which has its recesses filled with an infected albuminous fluid, I go on in Tube 4 to investigate the question as to how far the antiseptic can penetrate into the walls of the wound. *Tube 4* is, as you see, a tube with hollow spikes. I have coated it inside with infected serum agar, and the hollow spikes give a greater depth of infected lining and also a better hold for that lining. As soon as the agar has solidified the infected tube is filled with antiseptic. And then we can, after an interval, pour out the antiseptic, fill in with nutrient broth or trypsinised serum, and then incubate. Any microbes which have been left alive in the lining will now grow out into colonies, and be visible through the walls of the tube.

FIG. 10.



A test-tube standing on spike legs, representing a war wound with diverticula.

Let me show you a set of typical results obtained by the procedures I have just described, using the antiseptic of Dakin, which is to-day perhaps the most popular of all antiseptics.

In Tube 1 we have obtained, as you can see by these subcultures, complete sterilisation. And it was obtained after only momentary contact with the antiseptic. In Tube 2, where a lightly infected serum was shaken up with an equal bulk of the antiseptic and then incubated with it, we have in this mixture of serum and antiseptic a very vigorous growth of microbes. You see the medium has become turbid, and there has been an evolution of gas which has pushed up the plug of congealed vaseline. In Tube 3—and here the antiseptic stood for four hours in the barrel of the tube—we have in that barrel a teeming multitude of microbes. And in Tube 4, after four hours' contact with the antiseptic, only that very thin layer of the infected lining which coats the barrel has been completely sterilised, and in the concavity of every spike one can see that the bacterial colonies have in the depth come up quite thickly, and that it is only in the very surface layer that the microbes have been killed. And I here show you in a parallel tube which has been incubated 24 hours longer that the microbes you have seen growing in the deeper layers very soon penetrate the sterilised superficial layer, and invade the fluid contained in the barrel of the tube.

When we find an antiseptic giving results quite different from those I have here shown you it will then, for the first time, become a rational policy to use an antiseptic at the front and to leave it in the wound with a view to safeguarding the patient during lengthy transport.

Suggestion that the bacterial infection in the wound can be kept down during transport by frequent re-applications of an antiseptic.—In the earlier period of the war the only method of re-applying an antiseptic was that of taking down the dressing, syringing the wound, and completely re-dressing. That was, especially in the case of deep wounds and compound fractures, a very lengthy and painful procedure, and one which was nearly impracticable in transport. For that complete re-dressing there has now been substituted by Carrel a procedure for washing and refreshing the surface of the wound through rubber tubes. According to Carrel, Dakin's antiseptic should be employed and this should be applied every two hours. Let me about the application of this in transport say this: that it would, I think, be impracticable to carry it out on a sufficiently

large scale and sufficiently systematically; and treatment with Dakin's antiseptic applied in an unsystematic manner gives exactly the same results as simply keeping the wound wet.

Suggestion that the set-back in the wound during transport could be prevented by dressing with hypertonic salt solution.—The set-back in the wound with its resulting tragedies could, I think, be avoided by drawing out lymph in a continuous manner from the tissues, and by holding up at the same time the emigration of leucocytes. By the outflow of lymph we should be driving back and expelling invading microbes. We should also thereby be preventing the conditions in the walls of the wound becoming unwholesome to leucocytes. We should further, by the continuous outpouring of lymph, be effectively combating the corruption of the discharges in the cavity of the wound. And lastly we should, at the same time, be preventing any drying up of the wound. By holding up the emigration of leucocytes we should (you will remember that leucocytes will when they break down, furnish trypsin) be taking steps to prevent the corruption of the wound discharges.

We have in a hypertonic solution the therapeutic agent we require for these purposes. The proper way of using it is to apply to the wound three or four layers of lint thoroughly soaked in 5 per cent. salt solution; to impose upon these, as a reinforcement, three or four more layers of lint thoroughly soaked in a saturated salt solution and then cover the whole with jaconet, or other impermeable material.

REMEDIAL TREATMENT.

I now pass from discussion of the method of preventing the set-back that occurs in transport to the discussion of remedial treatment. The set-back will, as we have seen, have given us either a tryptic suppurating wound or a dry slough-covered wound. In each case the *first item in treatment* will be to get a clean surface. For that it will, in the case of the tryptic suppurating wound, suffice to wash away the tryptic pus. In the case of the desiccated slough-covered wound we must get rid of the sloughs. The rational way to do that will be by *cleansing digestion*. Such cleansing digestion can be obtained by treating the wound with hypertonic salt solution. This will, as we have already seen, break down leucocytes, setting free trypsin, and then the free trypsin will rapidly, and especially rapidly if we let the hypertonic salt undergo dilution, amputate the dead from the living tissues. Let us note that what we set out to do by the use of hypertonic salt solution is only to achieve more rapidly, and, as we shall see, with less risk of infection, what putrefaction and the destruction of leucocytes by microbes would, if we allowed things to run their course, spontaneously effect. The *second item* of treatment in each case will be to combat the infection which has found a lodgment in the lymph spaces in walls of the wound cavity. To deal with this we require to wash out by an outpouring lymph stream, and this, as I pointed out a moment ago, is obtainable by treatment with reinforced hypertonic salt solution.

If the train of reasoning I have laid before you is correct, it will follow that hypertonic salt solution is the agent we require both for preventing the set-back due to interruption of treatment in transport, and also for remedial treatment.

EXPERIMENTS WHICH EXHIBIT THE PROPERTIES OF HYPERTONIC SALT SOLUTION.

You will very reasonably here expect me to produce experiments to show that a hypertonic salt solution has the virtues I ascribe to it. You will want to see for yourselves that it attracts water and can draw out fluid from moist tissues; and that it can set free trypsin from pus, and initiate digestion.

Drawing Action of Strong Salt Solution.

I have here (*a*) two cylinders of agar containing salt to saturation and (*b*) two cylinders of water agar—all cast to the same size in 100 c.c. measures, and all rendered insoluble by an addition of formalin. Let us take first the cylinders of water agar. Upon the one of these as it stood in the measure was imposed a little saturated salt solution, solid salt being afterwards supplied as required. You see that the salt has here drawn out water copiously. The agar has everywhere detached itself from the walls, and we have in the interspace and on the top of the cylinder some 40 to 50 c.c. of fluid. The control cylinder of water agar which has been exposed to the air has, as you see, not shrunk at all.

Exactly the converse has happened with the cylinders of salt agar. These were taken out of their moulds: one was put down to steep in water—that one has, as you see, swollen to twice its bulk; the other was immersed in saturated salt solution—that one has not altered in bulk. We thus see that salt attracts to itself water. It can, according to the conditions, draw it out from or into a moist menstruum.

I have here in these three test-tubes another form of moist menstruum—cotton-wool impregnated with egg-albumen. The plug—in each case a very tight plug—is, as you see, placed half way down the tube, dividing it into an upper and lower compartment; and immediately below the plug I have a lateral hole (now sealed with plasticine).[3] Through this hole I can wash out both compartments very thoroughly, and fill and empty them without disturbing the plug. I have used in these experiments three fluids: a diluted egg-albumen with a specific gravity of 1026 for my plug, and two extracting fluids—water, and a saline solution containing about 8 per cent. of common salt with a specific gravity of 1052. In *Tube 1* I have water above and below; in *Tube 2* salt solution above and below; and in *Tube 3* water above and salt solution below. And here are the results obtained 24 hours after by emptying out the fluids and boiling them *secundum artem*. In *Tube 1* we have in the fluid from the upper compartment a mere trace of albumen; in that from the lower a very massive floccular deposit. That means that in the lower compartment the heavier albuminous fluid has sunk to the bottom, and in the upper only a mere trace has diffused upwards against gravity. In *Tube 2*, where both compartments were filled with salt solution, we have in the upper a massive floccular deposit, and in the lower a heavy but not nearly as heavy a one. It is the result in the lower compartment which specially interests us. It shows that an albuminous fluid is drawn down into salt solution in opposition to gravity. In the upper compartment, superadded to the drawing action of the salt, we have a displacement upwards of a lighter by a heavier fluid. In *Tube 3* (see Fig. 11), with water above and salt solution below, the upper compartment contains, as in Tube 1, only a mere trace of albumen. In the lower compartment we have again, as in Tube 2, a very heavy deposit of albumen drawn down against gravity.

I have here other experiments of which I show you photographed drawings. All these bring out that when strong salt solution and water are brought into apposition, and we introduce such a succession of obstacles as are provided by a cotton-wool plug or a wick, we get, so far as the convection of fluids is concerned, the same results as with a thin membrane, such as parchment paper or a film of formalin gelatine. But with respect to the character of the fluid we get a different result. When we employ only very minute pores we filter out albuminous substances; where we employ macroscopic pores albuminous substances are carried through.

In my next experiment (Fig. 12) we have in one beaker saturated salt solution and in the other water coloured with methylene blue. To maintain the fluids at the same level we connect them up with a siphon filled with uncoloured water. We then establish a further connexion by means of a siphon filled with uncoloured water and blocked by a cotton-wool plug at the one end. This end goes down into the salt solution, but it is only just immersed. When we now watch events—and it is a question of watching them for weeks—we find that the coloured water is drawn up into the open limb of the plugged siphon in the manner shown. In the case of the open siphon nothing of this sort occurs.

In the next experiment (Fig. 13) we have a series of three tubes arranged tandem and connected up by wicks of moist bandage fitting very loosely in siphon tubes. We have in Tube A plain uncoloured water, in Tube B water coloured with methylene blue, and in Tube C saturated salt solution—all these being filled in to exactly the same height, and then protected against evaporation. We now observe that the level of the fluid in C gradually rises, while that in A and B sinks; and at the same time the colouring matter from B is gradually conveyed up the wick in the direction of C, but is not carried up in the direction of A.

In the next experiment (Fig. 14) we have again a series of three tubes arranged tandem and connected up by wicks as in the last experiment. In A we have plain water, in B an albuminous fluid, and in C saturated salt solution—all filled in to exactly the same height. As in the last experiment, the level of the fluid rises slowly in C and sinks away

[3] In sealing with the plasticine care must be taken not to produce a positive pressure, and so drive albumen up into the upper compartment.

in A and B. We then unship Tubes A and C, add salt to A, and then boil both. We find that a great deal of albumen has been carried over into C, and that none has diffused over into A.

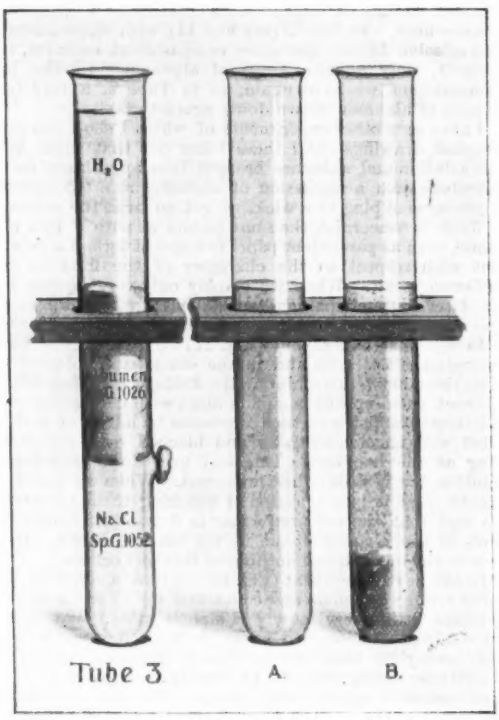
The Setting Free of Trypsin by Hypertonic Salt Solution.

You will probably not want to see any further experiments on this point. But I have still to make good to you that a hypertonic salt solution sets free trypsin from pus and initiates digestion. On that matter I will content myself with showing you the two following experiments.

Experiment 1.—I have here, as you see, two test-tubes filled nearly to the top with egg-albumen. To this was added ½ per cent. of carbolic acid, and the albumen was then solidified by immersing the tubes in boiling water. That done I took two cotton-wool plugs and steeped them in a pus to which I had added again ½ per cent. carbolic acid. I then inverted my tubes, the one into a beaker containing 5 per cent. salt, the other into a beaker containing physiological salt solution. (Fig. 15, A and B.) To these also I added ½ per cent. of carbolic acid. You will understand why I chose carbolic acid as my antiseptic when I tell you that it is an antiseptic which does not destroy trypsin or impede digestion. You see in the drawings made after the tube had been incubated for 48 hours, that in Tube A, the tube which was immersed in hypertonic salt solution, the egg-albumen was extensively digested, while in Tube B there was only a mere trace of digestion.

Experiment 2.—I here try to imitate the conditions of slough-covered wounds. I have in these beakers a foundation of coagulated white of egg containing 0·5 per cent. of carbolic acid. On the top of this I have in each case a

FIG. 11.

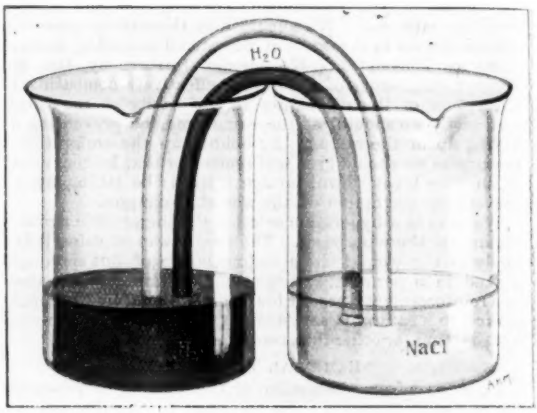


Tube 3 is flanked with test-tubes labelled A and B showing the result of boiling the fluid from the upper (A) and the lower (B) compartments of this tube.

disc of lint, woolly side up, firmly fastened down by adding another layer of egg-albumen and coagulating this by heat. Upon the lint I have poured a non-tryptic pus, giving, of course, an equal amount to each beaker. In this way I have made what I think can pass as representing fairly closely pus-impregnated sloughs in wounds firmly adherent to the tissues beneath. (Fig. 16, A and B.)

We now pour upon one of the artificial sloughs 5 per cent. and upon another 0·85 per cent. solution made up with ½ per cent. carbolic acid, and we may pour upon a third Dakin's solution. And we now place them all in the incubator. You see here what has happened after 24 hours. In *Beaker A*, where the artificial slough has been treated with

FIG. 12.



The left-hand beaker contains water coloured with methylene-blue; the right-hand beaker strong salt solution. The beakers are connected up by two siphon U tubes—the upper being an open siphon filled with uncoloured water; the lower a siphon plugged with cotton-wool and, like the upper siphon, filled in at the outset with uncoloured water.

hypertonic salt solution, the slough has loosened itself from its bed, and floats up as I pour in water. In *Beaker B*, where I imposed only physiological salt solution, the slough is still firmly adherent. And the same holds of *Beaker C* (not figured), where we have Dakin's solution.

We have here, as you see, an instructive experiment. And we can derive from it more instruction than has as yet appeared. In the first place, if we carry the experiment further, the slough which has been treated with physiological salt solution will also separate. In contrast with this will be what will happen with the artificial slough treated with Dakin's solution. Here, especially if the Dakin's solution is periodically renewed, the clot will remain adherent. For the Dakin's solution, while it is destructive to leucocytes, is when not quenched by albumen destructive also to the trypsin which brings about the separation of the slough.

We can always appreciate the situation and tell what is going to happen whether in the wound or *in vitro* by taking samples of the fluid and testing quantitatively for trypsin with milk containing about ½ per cent. of calcium chloride cryst., and we can when making experiments *in vitro* on the separation of artificial sloughs, hurry up the events by conducting the digestions at 50° C.

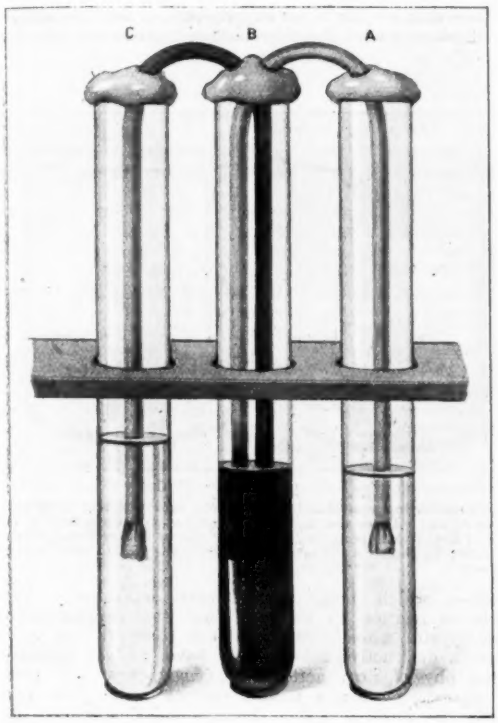
We can also vary our experiment with weak and strong salt solution by leaving out the antiseptic. Then microbic growth will, more particularly in the weaker salt solution, proceed unchecked, and the destruction of leucocytes by that growth will play an important rôle in the loosening of the clot. Meanwhile, the microbes will be everywhere making their way deeply into the albuminous substratum. This imitates what is occurring in every untreated slough-covered wound. While on the surface sloughs are decomposing and separating, in the depth further tissue is becoming heavily infected and gangrenous. In treatment we must combat that inward extension of the infection, and since we cannot block the infection by antiseptics, we must place mechanical and biological obstacles in its path. That means we must get lymph to pour out in full stream from the deeper tissues, and, if we achieve this, we may, after the sloughs have separated, look to have a clean, comparatively lightly infected wound surface.

TREATMENT OF THE WOUND IN THE CASE WHERE WE HAVE ONLY A LIGHT SURFACE INFECTION.

When we have got back to a clean and only lightly infected surface we must think out our next step in treatment.

It will help if we first review what we have learned by the way so as to see the whole history of the wound in perspective.

FIG. 13.



Tube A contains uncoloured water; Tube B, water coloured with methylene blue; and Tube C, saturated salt solution. The fluids stood originally at the same height in each tube.

We have learned that there are in wound infections two supreme dangers. *First*, there is the danger associated with the buried infection. We have appreciated that the effective and only remedy for this is the immediate opening up of the infected dead spaces, and you will remember that is a question of converting a buried infection into an open surface infection. The *second* very serious danger is that intensification of the surface infection which follows upon a lengthy interruption of treatment during transport. This, regarded from the point of view of loss of life and limb, ranks next in order of importance after delay in dealing with the buried infection. When the set-back due to transport has been prevented or remedied, we have confronting us the problem which, if treatment had been uninterrupted, would have presented itself earlier—the problem as to how to treat a slight infection of a naked tissue surface.

One of the ways of treating this is to leave the wound to heal up from the bottom, limiting oneself to such re-dressing as would prevent erosive digestion. By this programme the patient would, when his wound is a large one, be condemned to very many months of disability and also of bacterial intoxication. For the fact has got to be faced that it is all but impossible to maintain satisfactory conditions in a large wound for months on end.

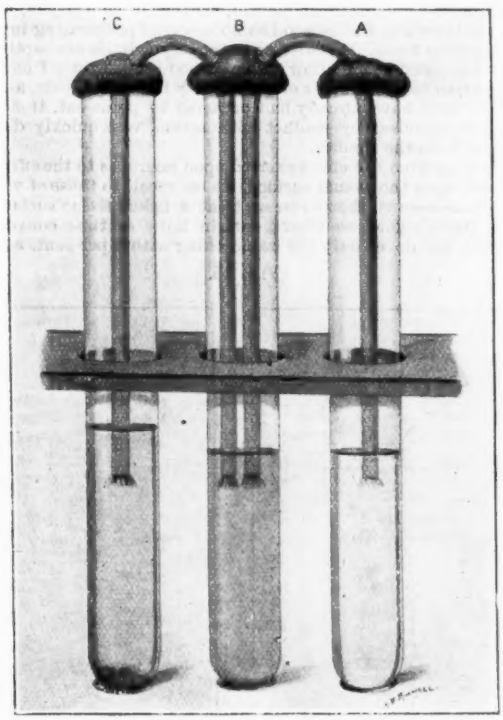
The alternative programme is for the surgeon to close the wound with the minimum delay. If the anatomical conditions permit, and the bacteriological examination shows the wound surface to be practically uninfected, or if the wound is only a very few hours old and the implanted microbes cannot yet have grown out, the wound can, after removal of all dead and foreign matter, be immediately closed—the surgeon, of course, standing by to reopen the wound if symptoms of buried infection develop. If, on the other hand, bacteriological examination shows that the wound surface is appreciably infected, or the history of the case makes this practically certain, then we should, by closing the wound, be violating all the principles of surgery. For we should simply be converting a surface infection into a buried infection. The proper step to take with a wound which is appreciably infected is to reduce the microbic infection to the point at which it is negligible and then re-suture.

Methods of Dealing with the Microbic Infection.

The microbic infection may be dealt with by any one of the following procedures.

In the *first place* we can employ the physiological procedure. If we elect to do this, we must think out clearly the physiological problem. For example, it will be inappropriate when dealing with a purely superficial streptococcic and staphylococcic infection to continue the application of hypertonic salt solution. The effect of that would be, on the one hand, to hold off phagocytes from the microbes (for strong salt arrests emigration); and, on the other hand, to provide the staphylococcus and streptococcus with lymph, a fluid in which they can grow and disseminate themselves over the whole face of the wound. What we want is an application which calls out leucocytes, and which will restrain, or which at any rate will not activate, the lymph flow. Physiological salt solution, and zinc sulphate in ¼ per cent. solution, and no doubt many other heavy metal salts in dilute solution, are the sort of agents we require. But what is, above all, essential to success in physiological treatment of a surface infection is to be very assiduous in removing any leucocytes which may break down upon the face of the wound. That is a question of maintaining intact the antitryptic power of the discharges.

FIG. 14.



Tube A contains plain water, Tube B a watery solution of egg-albumen and Tube C saturated salt solution.

A *second method* of procedure—I may call it the *unreasoning antiseptic procedure*—is to employ an antiseptic, considering in connexion with it only the fact that it is called an antiseptic. That means using an antiseptic without laying stress upon the assiduous cleansing of the wound surface and the maintenance of good physiological conditions; without inquiring whether the antiseptic can, when brought into external contact with pus or an infected tissue, penetrate into it; and without asking whether the antiseptic hinders phagocytosis, or destroys the antitryptic power of the blood fluids, or permits or interferes with tryptic action.

This unreasoning antiseptic procedure is constantly employed. It has led to failure upon failure, and it would be a matter for wonder if it did succeed.

The *third* and last method of procedure I may call the *combined antiseptic and physiological procedure*. If we want to find a method of this sort we shall not find it by inquiring for it under this name. What we have to seek is a method which proclaims itself an antiseptic method and which in this guise combats effectively, but perhaps not with full comprehension, corruptive changes in the wound.

The method of Carrel is, as I think, such a method. I would propose to make good that it is a combined antiseptic and physiological method; then to survey the results obtained; and finally to consider how to determine how far the results should be credited to the antiseptic, and how far to the physiological, element in the treatment.

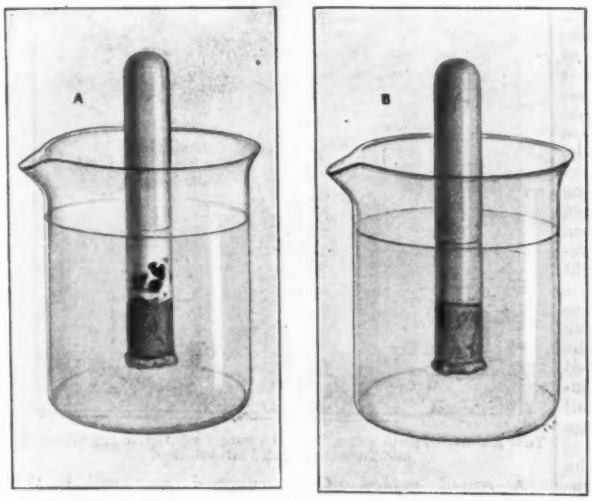
We have in Carrel's treatment two factors: (*a*) Dakin's antiseptic, or, as I should prefer to call it, Dakin's therapeutic agent; and (*b*) Carrel's procedure for washing and refreshing the wound surface in the intervals between the complete dressings. Now each of these factors, quite irrespectively of what it does in killing or removing the microbes, makes the conditions in the wound unfavourable for microbial growth. Let me, taking first Dakin's fluid, and then Carrel's washing procedure, try to make for you an inventory of their directly anti-bacterial, and their physiological or indirectly antibacterial, effects.

Dakin's Fluid.

Dakin's fluid is, as I have shown you,[1] a very ineffective antiseptic when it is brought into application upon microbes suspended in serum. It is also, as I have shown you, an antiseptic which has as good as no power of penetrating into albuminous fluids. It is also an extremely volatile antiseptic. When exposed in a shallow dish at blood temperature I have found it to lose four-fifths of its potency in half-an-hour, and it will, as I have already had occasion to point out, if not already quenched by contact with serum, very quickly disappear from the wound.

Turning from the effect exerted upon microbes to the effect exerted upon the wound surface, let me recall to those of you who have seen it, that when we treat a naked tissue surface with Dakin's fluid, we after a certain lapse of time convert it (and we do exactly the same thing with 5 per cent. salt

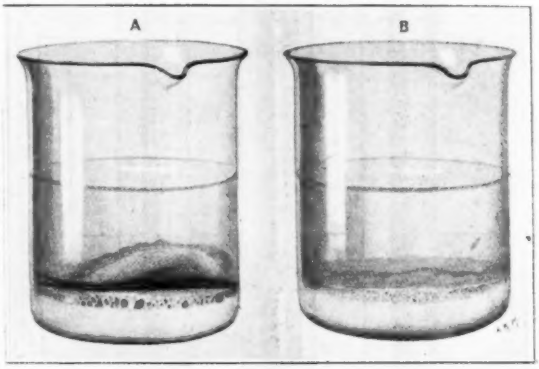
FIG. 15.



Test-tubes filled with coagulated egg-albumen; then plugged with cotton-wool impregnated with pus; and then inverted into beakers. Beaker A contains hypertonic, Beaker B normal salt solution.

solution) into a bright coral-red granulating surface. That means we convert it into a defensive surface excellently well provided with new-formed blood-vessels from which active leucocytes and fully potent lymph will emerge. Leucocytes also are affected by Dakin's fluid. Experiments show that it is destructive to phagocytosis. When we add one part of the reagent to nine of *excoagular blood* we reduce the phagocytic power of that blood by more than one-half. We abolish phagocytosis when we add one part of the reagent to four of blood. The fluid elements of the discharge also are altered in character by Dakin's fluid. Let me remind you here that we saw in our experiments on artificial sloughs that treatment with Dakin's solution hinders the digestive

FIG. 16.



Beakers containing coagulated egg-albumen into which is imbedded a layer of lint. Upon the lint was poured pus, and upon this in the case of Beaker A hypertonic, and in the case of Beaker B normal salt solution. In Beaker A the artificial slough has separated off by tryptic digestion.

processes which bring about their separation. This stands in relation to the fact that the reagent exerts upon trypsin, when albumen is not there to act as a buffer, a destructive action. We have, as you perceive, here a physiological action which may quite well come into operation when a wound surface which has been tryptic is flushed. But Dakin's fluid will act not only upon trypsin. It abolishes also the antitryptic power of the blood fluids. So, applied in the wound, it might perhaps with one hand give protection, and with the other hand take it away. But what really does happen is, I suppose, that all free trypsin is destroyed by the flush and that afterwards, when the hypochlorite is quenched or vaporised, new antitryptic lymph and with this new leucocytes emerge from the wound surface.

And the particular train of thought here started is, perhaps, worth following up. We may, I think, profitably ask ourselves whether if put to our election between maintaining antiseptic action continuously at the expense of physiological action, and alternating antiseptic with physiological action, we should not do well to elect for the latter policy. And we may muse whether it was not specially felicitous to have employed, as Carrel has done, an antiseptic which is very readily quenched and also very volatile and to have applied it discontinuously. Had that antiseptic been employed by a method of continuous irrigation, phagocytosis on the face of the wound would have been excluded, and we should have had in the cavity of the wound a lymph whose antitryptic power had been destroyed.

But I have already said enough about Dakin's fluid if you have appreciated that it is a poor antiseptic; that it acts as a poison upon leucocytes and blood fluids; that its physiological action is a very complicated one; and that its beneficial effects cannot be due simply to its antiseptic action.

Carrel's Method.

I now come to Carrel's procedure of intercalating between the complete dressings a frequent flushing and refreshing of the wound surface and for carrying out this flushing unlaboriously. Allow me to say that we have here, I think, far the most important contribution made to surgical technique since the beginning of the war. But to that let

[1] Vide supra, Experiments on Antiseptics.

me add, that while Carrel's procedure gives us a new and improved technique for the application of antiseptics, much more does it give us a new and improved technique for physiological treatment. For that treatment the assiduous removal of corrupted and corruptible discharges is, as you know, the primary desideratum.

We now turn to the results of the treatment of infected wound surfaces by Carrel's method, and we may take them from Carrel's book. But it will be well, in order to keep to the kind of wound infection here under discussion, to exclude from consideration wounds complicated with fractures—for in those effective washing is difficult. Within our purview will then only lie wounds of soft parts, and in Carrel's book these are distributed under (*a*) fresh wounds—wounds taken in hand when 5 to 24 hours old; (*b*) phlegmonous and gangrenous wounds; and (*c*) suppurating wounds. The first of these categories would broadly correspond to wounds with a naked tissue surface lightly infected. The others would correspond to wounds which have, through postponement of treatment or its interruption by transport, suffered a set-back, converting an originally light surface infection into a heavy infection with invasion of the deeper tissues. Having now got your bearings, you will see that we have already, in discussing remedial treatment for the set-back, discussed the last two of Carrel's three classes of wounds. And we learn from the data he gives with respect to these only this—that the combined operation of treating the set-back and reducing the remaining light infection to a negligible infection permitting successful re-suture occupies by his method 3 to 4 weeks. This, of course, does not tell us how long it takes to convert a light surface infection into a negligible one. For that we must turn to the data relating to fresh wounds; and under that heading we find that where there are sloughs to be dealt with 15 to 20 days; and, where there are none, 5 to 12 days are required. That gives us a measure of what can be done by what I have, I hope not without good warranty, called Carrel's "combined antiseptic and physiological treatment."

Let us consider what Carrel's results tell us. They tell us in the first place that, whatever else it is, Carrel's treatment is not in any sense a *therapia magna sterilisans*. Regarded as an antiseptic method, it is a method of "*fractional sterilisation*" requiring for the case we are considering—the simplest case of all—at the rate of 12 douches a day a series of 60 to 144 antiseptic douches. And if I am right in regarding Carrel's treatment as a combined antiseptic and physiological treatment, we have, superadded to the antiseptic, a series of 60 to 144 physiological attacks upon the microbes—each such attack starting from an atryptic condition.

The consideration of these figures leads directly to what I have to say in conclusion. While Carrel's work constitutes a very notable practical achievement, regarded as science it comes short in the respect that adequate control experiments are lacking. I do not mean that it has not been demonstrated that Carrel's treatment accomplishes what was impossible by the old system of syringing with antiseptics and leaving the wound afterwards to fill with pus. The inefficacy of that older treatment was attested by tens and hundreds of thousands of control experiments. What I mean is, that we have not in Carrel's work any control experiments with more potent and penetrating antiseptics to negative the idea that with these one could with less than 60 to 144 consecutive douches convert a light surface infection into a negligible one. And again, we have not from Carrel any control experiments with a well-thought-out physiological treatment to negative the idea that one could achieve a similar sterilisation by 60 to 144 successive physiological attacks upon the microbes, starting each time from an atryptic condition.

If we would abide in the spirit of science, every unwarranted assumption must go. We must not assume that when we have successfully combated a surface infection by a series of 60 to 144 therapeutic operations we have reached finality. And much less must we, from the fact that a treatment successfully combats surface infections, infer that it is also an effective treatment for infections which penetrate into the deeper tissues. It ought to come home to us instead that we must never look to find for quite different categories of wound infections—i.e., for quite diverse conditions—any one routine (antiseptic or physiological) treatment.

MASKS FOR FACIAL WOUNDS.

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IN describing the use of modelled masks for covering facial wounds I have to call attention at the outset to two important points: no attempt is made in any of my contrivances for the alleviation of the sufferings of the wounded, to restore functioning or to produce a cosmetic effect by plastic methods.

In certain cases the effects of impaired functioning may be alleviated to a greater or lesser extent, as, for instance, where the nerves affecting the salivary glands have been destroyed, or where the nerves of the eye have been so injured that the control of the tear-ducts is defective and a constant discharge is the result. In such cases I arrange for the attachment of an absorbent pad or pads within the mask which relieve the patients from considerable inconvenience.

Dr. A. Pont, the director of the Dental School of Lyons, in an article in the *British Dental Journal*, deals constructively with the question of nasal prosthesis, and incidentally remarks that "living restorations are indicated for cases of flattened noses, in certain cases of fracture, &c., but cannot enter into account where it is a question of replacing the nose totally or partially."

My work begins where the work of the surgeon is completed. When the surgeon has done all he can to restore functions, to heal wounds, to support fleshy tissues by bone-grafting, to cover areas by skin-grafting, I endeavour by means of the skill I happen to possess as a sculptor to make a man's face as near as possible to what it looked like before he was wounded. My cases are generally extreme cases that plastic surgery has, perforce, had to abandon; but, as in plastic surgery, the psychological effect is the same. The patient acquires his old self-respect, self-assurance, self-reliance, and, discarding his induced despondency, takes once more to a pride in his personal appearance. His presence is no longer a source of melancholy to himself nor of sadness to his relatives and friends.

As a general rule the cases that come to me are those in which the wounds or depredations of disease have been so severe as to remove them beyond the range of even the most advanced plastic surgical operations. So far as my treatment goes the size of the area affected is negligible. In theory it is as easy to make a mask for a whole face as for a space an inch square to cover a small palpitating area such as is often done in the case of skull wounds.

The essential of the treatment is the restoration of features; the features may have been originally ugly or beautiful. As they were in life so I try to reproduce them, beautiful or ugly; the one desideratum is to make them natural. Considerable experiment has proved that only a rigid mask can be depended upon, both for hygienic and cosmetic reasons. Various soft substances, such as gelatine mixtures, have been tried and have failed. Such applications cannot be either healthy or beautiful.

Description of Technique.

In order to approach as near as possible to nature, by my method a casting is made of the patient's face in plaster-of-Paris. This can only be done when the surgeon has discharged him as superficially clean and healed. This cast is essential, for a perfect edge-fit is required, so that adjustment is reduced to a minimum. All wound cavities are filled up with dressing and cotton-wool, and these in turn covered with goldbeater's skin. The nostrils are blocked with cotton-wool, the patient breathing through the mouth; if through the nose a quill is inserted for breathing throughout this operation. It depends on the area of wound, of course, as to whether nose or mouth breathing can be allowed during the process.

Having obtained the mould and dried it slowly the next stage is to French-chalk it and take from it a clay or plasticine squeeze, which provides a positive model of the patient's healed wound and the surrounding normal tissue surface. This model is further developed by means of sittings of the patient, and this stage is completed by taking another cast—a negative.

The task now before the manipulator is to reconstruct the destroyed feature or features from the model taken from this

CASE 1.—Artificial pinna.

CASE 2.—Replacement of lost parts by metallic nose.

CASE 3.—Showing artificial nose and cheek, artificial eye, and metallic eyelashes.

CASE 4.—Mask used in case of rodent ulcer.

negative mould, by building them up to match the corresponding or adjoining features of the patient, or from prewound photographs, taking the utmost care the whole time to keep the adjustment of the edges to the patient's face-planes. A cast is then taken of this; further manipulation is required for the fitting of an artificial eye (if the case includes such); a last comparison with the original is made, and the mask, in plaster, is complete.

From this an electrotype plate is deposited. It is of pure copper, 1/32 inch in thickness. The necessary fitments for glass eye and attachments are fixed, and it is finally well covered with an electric deposit of silver.

The last adjustments are now made to the patient's face, the securing of the plate to the face being carefully considered. The attachment is usually made by means of strong spectacles, but spirit-gum and ribbons have sometimes to be used, varying with the character of the wounded area.

The utmost care has to be made in fitting the attachments. I have received great help from Messrs. J. Hamblin, Ltd., the makers of the spectacles, who have devoted special care and attention to the work. Everything depends on the efficiency of the attachments in the matter of comfort to the patient, which is necessary in such cases, so that his attention shall never be drawn to his deficiency unless necessarily. The adjustment must be exact, therefore, and the edges of the plate can in no case be allowed to part from the sections of the patient's skin with which they coincide.

The plate has now to be pigmented to match the complexion of the patient. A thin coating of cream-coloured spirit enamel forms a good basis for the subsequent flesh-colour matching, as it leaves the oil-colour mat when dry, which facilitates the blending of plate with face. If the patient has an oily or shiny skin a semblance is easily obtained by varnish rubbed down to match. I do not use false hair for eyebrows and eyelashes now. The eyebrows are painted to match and the eyelashes I make of thin metallic foil, carefully soldered to the plate, cut finely by scissors, and tinted to match. I purchase the plain glass eye-sections and paint the eye-match on the concave reverse myself. Sometimes I do not use glass at all, but paint a semblance to match direct upon the metal mask, due preparation for this mode, of course, having been made in the plate.

The plate can now be worn and the patient finally discharged. Renewal of the pigmentation must be made from time to time, however, for scar tissue changes the contours of the face, and readjustments must occasionally be made. If these changes are very great a new plate might have to be substituted for the original, but in this only the same difficulties that were met with in the original stage would be encountered.

The Cases Dealt with.

My work has been done in close and constant coöperation with Lieutenant-Colonel Bruce Porter, C.M.G., R.A.M.C. (T.), and the medical staff of the 3rd London General Hospital at Wandsworth. It grew out of the establishment there of the splint room, of which I was in charge, and in which specific splints were prepared for exceptional wounds, and plaster casts taken of all such and kept to form the museum of cases there.

Sir Alfred Keogh, G.C.B., Director-General A.M.D., has directed the staffs of the various military hospitals to place all cases suitable for this treatment at the 3rd London General Hospital, and I am always glad to know of cases from those or other sources in order that all that is possible to be done for the facially disfigured shall be done.

It is obvious that if, in the cases hereafter described, plastic surgical operations could have brought about an endurable result, then such would have been preferable. To wear an artificial substitute for any feature must necessarily be always a burden added to the consciousness of the man or woman so sorely stricken. The fact remains, however, that through lack of time or accommodation in hospitals, or through plastic-surgical failures due to immense pressure of work, cases come out which only the hand of the sculptor can deal with, or hands trained to serve both plastic and sculptural manipulations, or a process combined of both.

In the cases of which particulars are given I have selected three of soldiers and one of a civilian, a woman. The latter I selected for the reason that the ravages of the disease were very extensive, and the surgical operation therefore comprised a considerable area of the lower half of the face, and, further, to note the fact that it is not only the wounded in battle or by accident that may take advantage of this remedial treatment, based on the skill (such as I and others may possess) and the knowledge of the sculptor. On these two things the success of the treatment entirely depends.

CASE 1.—*Injury:* Loss of right pinna by abrasion. The parts torn were so fragmentary as to be useless for a plastic operation. They were cut away, leaving the external orifice only exposed. (The functions of the inner ear are retained.) *Treatment:* A metallic pinna to match the left was modelled. *Attachment:* No mechanical means. Spirit-gum secures a perfect adhesion. The artificial pinna is only liberated with difficulty.

CASE 2.—*Injury:* Loss of nasal bones and cartilages, nasal process of frontal and superficial portions of both zygomatic processes of superior maxillæ. (After healing, by a slight operation, some nasal breathing was restored.) *Treatment:* Modelled metallic nose. *Attachment:* Spectacles, soldered on to the plate at bridge of nose. (Very simple, but quite effective.)

CASE 3.—*Injury:* Loss of nasal bones and upper part of cartilages, part of zygomatic process of superior maxillæ and right eye. *Treatment:* Metallic plate about 4 inches by 3 inches, inclusive of artificial nose and cheek, artificial eye and metallic eyelashes. *Attachment:* Spectacles on plate at bridge of nose, with a pillar fastening the limb of the spectacles to the side of the plate on the cheek-bone. For this extensive plate further security is obtained by the internal pressure of the fleshy terminal remains of the nose which becomes straightened when the mask is worn and fits into the plate. (Due care is taken to prevent discomfort by the pressure.)

Note.—In this photograph a special effort was made to indicate the plate-line (edges of the plate) by placing the camera only 3 feet from the patient. This to exhibit clearly the area covered. As a general rule the edges are not readily apparent.

CASE 4.—*Injury:* Effects of rodent ulcer and treatment. Lower face and nose. Loss of cartilaginous portion of nose, greater portion of alveolar part of superior maxillæ and symphysis menti, including on each side 1½ inches of the rami. (There is no control of salivation.) One aperture only serves the double purpose of respiration and alimentation. *Treatment:* An extensive mask, with modelled nose, lips, chin, &c., from bridge of nose to the cicatrice on neck; laterally fitting under both cheek-bones. *Attachments:* (1) Spectacles (which are detachable) fitting on bridge of nose; and (2) narrow ribbon, slotted through lower section of mask in front of throat, tied at back of neck. (The mask is worn with the greatest comfort and a large wad is fixed in the ample interior space for absorption of the effects of involuntary salivation, giving the patient increased comfort as well as the cosmetic advantage. The patient removes the mask when feeding and uses a feeding-cup.)

ALBUMINURIA IN THE TRENCHES.

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IN view of the investigations on albuminuria and trench nephritis that are now being carried out in casualty clearing stations and base hospitals, the following figures from the records of a field ambulance may perhaps serve a useful purpose.

Many patients are treated entirely in a field ambulance; others stay for several days before being sent down the line. In this field ambulance, during the months of December, 1916, and January and February, 1917, the testing of every patient's urine was adopted as a routine precedure. The results obtained are sufficiently interesting to warrant their being placed on record. In the three months under review all the sick of the division passed through this field ambulance, and the urines of all these patients were tested.

For the purpose of collecting the urine from large numbers pickle-jars were used, and proved very good substitutes for the specimen glasses of the general hospital. With the resources of a field ambulance the tests were simple. Acidulation and boiling, cold nitric acid were the tests used. No microscope, centrifuge, or other apparatus was available.

The following are the figures for the three months. The number of urines tested was 4085; the number of urines

showing albumin was 858 (21 per cent.), made up as follows:—

Showing a trace of albumin	596	(69·5 per cent.)
,, cloud ,, ...	136	(15·9 ,,)
In which the urine was loaded with albumin ...	126	(14·7 ,,)

An attempt was made to ascertain (1) in what percentage of cases the albumin persisted and for how long; (2) what proportion of cases presented renal symptoms; and (3) the relation of patient's temperature to albumin in the urine.

All the cases referred to in this paper are based on observations made during periods varying from two to seven days.

The figures for February, 1917, alone are given. The number of cases tested was 1442; the number of cases showing albumin was 310 (21·5 per cent.), made up as follows:—

Showing a trace of albumin	225	(72·6 per cent.)
,, cloud ,, ...	56	(18·1 ,,)
In which the urine was loaded with albumin ...	29	(9·4 ,,)

1. *In what percentage of cases albumin persisted and for how long.*—Of these 310 cases, (*a*) albumin disappeared from the urine in 132 cases (42·5 per cent.), made up as follows:—

On the second day in	72 cases	54·6	per cent.
,, third ,,	30 ,, ...	22·7	,,
,, fourth ,,	12 ,, ...	9·1	,,
,, fifth ,,	13 ,, ...	9·9	,,
,, sixth ,,	2 ,, ...	1·5	,,
,, seventh ,,	3 ,, ...	2·3	,,

One hundred of these patients returned to duty, their urine having been clear of albumin for three days. Up to the time of writing (March 25th) there have been no readmissions for albuminuria, and although some of them have been re-admitted for various diseases, no albumin has been found in their urine.

I have been unable to trace the remaining 32, as they were evacuated to a casualty clearing station with various diseases—P.U.O., bronchitis, trench feet, &c.

From the above table it is seen that of the 310 patients in whom albumin was found on admission 132 cleared up within seven days, and of these 132, 100 returned to duty.

None of these patients presented any renal symptoms and only very few any constitutional symptoms. They were mostly cases of inflammatory connective tissue, scabies, impetigo, dental caries, laryngitis, &c.

(*b*) One hundred and seventy-eight cases in which albumin persisted in the urine while in the field ambulance. These cases were evacuated to a casualty clearing station, after periods varying from two to seven days, for P.U.O., bronchitis, pneumonia, &c., or albuminuria. Albumin persisted in the urine.

On the second day in	82 cases	46·1	per cent.
,, third ,,	28 ,, ...	15·7	,,
,, fourth ,,	12 ,, ...	6·7	,,
,, fifth ,,	14 ,, ...	7·9	,,
,, sixth ,,	23 ,, ...	12·9	,,
,, seventh ,,	19 ,, ...	10·7	,,

From the above table it will be seen that albumin was still present on evacuation to a casualty clearing station in 178 out of the 310 cases showing it on admission—i.e., 57·4 per cent., or 12·3 per cent. of the total patients admitted to the field ambulance for the month.

I have traced these 178 cases to the casualty clearing station, and find that 90 (50·6 per cent.) were transferred to base by hospital train as albuminuria or nephritis after a stay in the casualty clearing station of from two to eight days. The remaining 88 I have also traced and find that they were evacuated to the base with other diseases, P.U.O., bronchitis, pneumonia, &c. I have been unable to find whether albumin was present in the urine when leaving the casualty clearing station or not. None of these 88 patients presented renal symptoms while in the field ambulance.

2. *What proportion of the cases admitted with albumin in the urine presented renal symptoms.*—Of the 90 cases evacuated to the base with the diagnosis of albuminuria or nephritis 40 presented no obvious renal symptoms except in some cases a persistent albuminuria which increased from trace to cloudy, although on a milk diet; some cleared up on milk, but relapsed at once on being given meat.

Fifty patients showed distinct renal symptoms whilst in the field ambulance. A short account of their condition follows.

History.—Four patients suffered from renal disease in civil life. One patient had been in the ambulance three weeks previously with trench fever, and then had a trace of albumin which persisted for two days. He was discharged on the eighth day apparently well. The majority of patients gave no history of previous illness.

Onset.—Rapid. In most cases patient stated he had been feeling ill for about 2-5 days. The first thing usually complained of was pain in the back and legs, then shortness of breath and puffiness of the legs and face. In four cases the reddish colour of the urine was the first thing noticed.

Symptoms.—There occurred in the following order of frequency: Bronchitis, 16; swelling of feet and legs, 14; hæmaturia, 13; shortness of breath, 12; headache, 6; frequency of micturition, 5; vomiting, 2; and cyanosis, 2. Some patients had only one or two of these symptoms, others more.

Urine.—In 23 patients the urine was loaded with albumin.
,, 26 ,, ,, ,, cloudy.
,, 1 ,, ,, contained a trace.

Temperature.—This was raised in 23 cases, normal or sub-normal in 27.

Cardiac changes were observed in 2 cases.

Two cases died. Both presented while in the field ambulance symptoms of uræmia, with cyanosis of a grey type.

The length of service in France of the 50 cases showing renal symptoms is as follows: Up to 3 months, 16; 4 to 6 months, 8; 7 to 12 months, 15; 12 to 24 months, 11.

The age incidence of the 50 cases showing renal symptoms is as follows: 18 to 25 years, 28; 26 to 30 years, 8; 31 to 35 years, 7; 36 to 40 years, 4; and 40 years and over, 3.

The majority of the cases were infantry serving in the trenches. The average per battalion was 4. A pioneer battalion gave the greatest number of cases—i.e., 6; the A.S.C. furnished 3, Division Ammunition Column 3, R.A.M.C. 3.

3. *Relation of patient's temperature to albumin in the urine.* (From the charts of cases which remained in the field ambulance for four days or more.):—

	Cases.
Patients' temperatures normal during stay in hospital (albumin disappeared within 7 days)	65
Patients' temperatures normal during stay in hospital (albumin remained)	47
Patients' temperatures fell to normal (albumin disappeared) ...	38
Patients' temperatures fell to normal (albumin remained) ...	31
Patients' temperatures remained high (albumin disappeared) ...	21
Patients' temperatures remained high (albumin remained) ...	20
Total	222

Albumin was found in 25 per cent. of the cases of P.U.O. admitted during the month of February, 1917.

Conclusions.

It is extremely difficult to draw any conclusions from the work done in a field ambulance, as the facilities are few and the time for observation limited. A few points and suggestions, however, may be helpful to others who have better opportunities for research.

One point impressed on the author during the past three months is the importance of testing the urine of every sick man.

Of the 50 severe cases referred to in an earlier part of the paper only 15 presented symptoms sufficiently obvious to enable the diagnosis of albuminuria to be made before reaching the ambulance. The remainder were admitted with other conditions, such as P.U.O., bronchitis, inflammatory connective tissue, tonsillitis, or even scabies.

I have also been struck by the large number of patients who, without renal or constitutional symptoms, show a trace of albumin in their urine. These cases are sent in to the field ambulance for complaints which do not seem to bear the slightest connexion with albuminuria—e.g., hernia, flat feet, varicose veins, scabies, impetigo, dental caries, and minor septic conditions. Some of these cases give a trace of albumin for a few days, which clears up under treatment and does not recur. The condition does not seem to bear any relation to the severe type of albuminuria, for of the slight cases which cleared up while in the ambulance and returned to duty only one has been readmitted. In this case the urine was loaded with albumin on readmission. This mild albuminuria is also met with in officers; 32 per cent. of those admitted showed albumin, but no case showing renal symptoms has been observed in the three months. In all cases amongst officers except two the albumin cleared up in a few days. This mild albuminuria appears to be physiological, possibly due to the conditions of life in the trenches, where excessive ingestion of protein, excessive fatigue, and exposure are common.

As regards the relation of temperature to albuminuria I have not been able to draw any definite conclusions. Patients

with a high temperature seldom have albumin, whilst those with lower temperatures frequently have. The true febrile albuminuria of the text-books, where the albumin disappears with the fall of temperature, has not often been seen, the temperature often falling while the albumin remains, and *vice versa*, in a most bewildering fashion.

That there is a definite trench nephritis there is no doubt in my mind, possibly an infective condition similar to the acute nephritis of civil life, but the anæmia does not seem to be so common. Suppression of urine has not occurred in any of the cases under observation. The respiratory system seems to be first attacked.

Cardiac changes have not been observed. With the resources at my disposal I have not been able to classify the severe cases, but I feel sure that they could be grouped in some such manner as: (1) Cases of old nephritis awakened again by climatic conditions in the trenches; (2) cases of acute nephritis which would have occurred in civil life; and (3) cases of trench nephritis.

It is hoped that this paper will prove some stimulus to the further investigation of albuminuria in the field, as the foregoing figures show that patients suffering from various ailments are frequently found upon examination to be suffering from albuminuria, which in many cases gives rise to no symptoms.

A UNIVERSAL ARM-SPLINT.

BY GEO. EWART WILSON, M.B. TOR., F.R.C.S. ENG.,
CAPTAIN, CANADIAN ARMY MEDICAL CORPS.

THE surgeon who has had to treat many cases of compound fracture of the humerus with suppuration must have felt how unsatisfactory were any of the splints at his disposal, and it was such a feeling that induced me to endeavour to work out a splint which should at any rate approach the ideal. It is not my purpose to discuss in any way the various splints in use at the present time, but simply to describe as briefly as possible the methods I employ.

The splint is made of a single rod of one-quarter inch round malleable iron, about seven feet long. It should not bend too easily, and is twisted cold. For descriptive purposes it may be divided into a chest-piece and an arm-piece. (See Figs. 1 and 2.) The former is shaped like the letter "W," and as it is the part which is attached to the chest wall, its curves conform to the antero-lateral outline of an average thorax. The latter consists of two limbs, an anterior and a posterior. The anterior turns immediately downwards and a little forward, with a fairly sharp bend at an angle of about 30°, forming the inner bar; and at a place corresponding to the bend of the elbow, turns directly inwards as the upper bar. The posterior passes outwards at right angles to the plane of the chest-piece, forming the projecting bar, until it reaches the level of the plane of the anterior arm, when it turns downwards parallel to the inner bar, forming the outer bar. Below the elbow it turns inwards as the lower bar, and at a suitable spot turns upwards to join the extremity of the anterior limb as the end bar. The measurements of the various parts of the arm-piece are as follows:—Projection bar, 6½ in.; inner bar, 5½ in.; outer bar, 13 in.; upper bar, 10 in.; lower bar, 16 in.; end bar, 4¼ in.

FIG. 1.

Chest-piece.

While it is desirable to have a war splint as simple as possible, it is very apparent that the model described may be modified. For instance, there might be a lock-joint where each limb joins the chest-piece; or steel might be used to replace the malleable iron, but for the universal use the latter is preferable, because once the plaster is firmly set, the position of the splint can be changed by simply bending it where the anterior and posterior limbs join the chest-piece, provided, of course, the material is of the proper strength.

FIG. 2.

Arm-piece.

The splint is applied as follows:—

The patient stands, or is seated on a high stool with a foot rest. A tight-fitting vest (undershirt), with the sleeve cut away from the side corresponding to the fracture, is put on and the fractured arm is held forward by an assistant, while he rests his good arm on the assistant's shoulder. It is important that the patient stand or sit erect with the shoulders in a position of rest, so that when the arm is applied to the splint the parts are in a natural posture. Three 3-inch plaster bandages are put round the chest, reaching into each axilla as far as one can comfortably go, and embracing the lower borders of the ribs in the axillary line. These must be put on snugly, for if loose, the cast will be uncomfortable. Now apply the splint, taking care that the plane of the arm-piece is directed forward, and the upper ends of the "W" are about the level of the top of the plaster. In this position try the arm, and if the elbow is going to be too near the lower bar, pull the chest-piece a bit lower. The arm is again held aside, and while an assistant holds the splint in position, some plaster cream is rapidly rubbed about the "W," and then two or three more bandages are applied. By the time a small crescent-shaped piece of plaster is cut away from each axilla, the splint should be fairly well fixed, and ready to support the arm. While the plaster bandages are being applied, shoulder-straps of adhesive strapping about three inches wide and having a pad for the protection of the clavicle are incorporated.

The flannel slings previously fixed to the splint are brought into position and the arm placed upon them. Extension is applied by adhesive bands front and back and attached to the lower bar. If the splint has been properly applied the humerus is directed downwards and slightly forward and the forearm across the body with the hand grasping the end bar. If there is any danger of pus tracking up towards the shoulder when lying down the patient is preferably put upon a Gatch frame.

The advantages of this method are manifold: it is simple, cheap, quickly made, and readily transported. Once applied it will remain in place for weeks without further attention. The whole weight of the limb is borne by the trunk, so that the shoulder-girdle is relaxed. It gives fixation of the fragments which is permanent and as much or little extension—for with a relaxed shoulder very little is required—as is desirable, without any pressure whatever upon the axilla. While designed for the humerus, it is just as applicable for the forearm, in which case the extension is made from the lower end of the outer bar; and if it is necessary to have the hand supinated the upper and lower bars can be twisted accordingly. Correct alignment is readily obtained, for the whole arm is exposed to anterior

and lateral views. The space between the bars is sufficient for the wounds to be easily and quickly dressed and with the minimum of pain, because the forearm remains fixed. The patients are comfortable, and unless otherwise contra-indicated they are free to move about at will, and whether up or lying down there is no change in the support of the arm, since the flannel slings run parallel to the transverse diameter of the body. The nursing is reduced to a minimum, and if the patient must remain in bed he is as easily managed as one with a septic arm but without a fracture. While one model for each side suffices, it is more convenient to have different sizes, but in a short man the splint is put on high up, while in a tall man lower down. It can be made anywhere, as any surgeon with a hammer and anvil should experience no difficulty in turning out a model from which as many as desirable may be made.

I have at present a leg-splint based on the same principle—namely, the permanent fixation of the splint to the trunk, so that the limb is applied to the splint and not the splint to the limb. In the near future I propose describing it in detail.

I would like to thank Lieutenant-Colonel W. B. Hendry for the kindness shown me. He has given me every opportunity to use his patients to experiment with the splint, and, in fact, it was upon a patient of his that I fitted my first model.

TEMPORARY "PILONS."

BY DR. A. H. BIZARRO,

LATE INTERNE OF THE LISBON HOSPITALS; ASSISTANT SURGEON TO WELSH METROPOLITAN WAR HOSPITAL, WHITCHURCH, NEAR CARDIFF.

THE word "pilon" is used in French-speaking countries for pestle or stamper. It means, from an orthopædic point of view, any device of prosthesis to enable cases of amputation to use their stumps for deambulatory purposes. Considering the great number of amputations during the war, and the drawbacks of keeping patients without using their stumps before being fitted with artificial limbs, any temporary appliance to enable patients to walk while awaiting complete healing of the stump and all other details required

FIG. 1.

Temporary pilons as applied to amputations through the thigh.

for the application of a definite artificial apparatus, would be of great practical use. Professor Depage and Dr. Martin (Belgium) were in their clinic among the first to make use of temporary pilons in these cases.

It is unnecessary to state the disadvantages of keeping an amputated limb in disuse for a prolonged period. The stump is liable to various types of deformities impairing the function of the joints, to œdema, terminal adhesions of the scar, hypersensibility, &c. The use of crutches may not only provoke and accentuate all these alterations, but will give rise to postural deformities of the body by reason of deviation of its gravitation centre as a whole. Besides, crutches can give rise to various inconveniences by pressure on vessels and nerves in the axillary region and on the points of contact of the hand due to grasping the handle.

Any temporary device that allows such cases to walk soon after the amputation has advantages which can be easily foreseen. The cicatricial processes are quickened, the stump gets used sooner to its proper work, the stay of the patient in hospital as a convalescent is shortened, and the definite artificial limb can be applied in much better conditions for a quick practical success, saving most certainly a sum of money in the great majority of cases. Besides, the pilons I have made can last several months in good condition for daily use.

The material required consists of a wooden frame, easily made, poroplastic, webbing, plaster, bandages, and a little felt. The first step in applying a pilon is to make a mould of the stump with poroplastic. With the patient standing (particularly in thigh cases) on the sound leg the bony tuberosities should be well marked, and the upper end of the first layer well adapted to them so as to support the weight of the body in walking. The lower end of this first layer, in the great majority of cases, is left open, and all the support of body takes place on the superior part of the tube.

FIG. 2.

The temporary pilon with extension applied.

Having moulded and fixed this inner coat of the pilon, keeping it very smooth on its inner face, it is covered with a few layers of plaster. Then, having tried it well on the patient, the wooden frame is measured, allowing for the heel of the boot, and is fixed to the inner cylinder by means of plaster. Webbing pieces are included in it, and when the plaster is dry, the inner cylinder is fixed to the frame by means of screws or rivets to make the whole more solid. For stumps of the thigh felt only is used on the upper part of the poroplastic, and I must emphasise that in these cases the bottom of the cylinder is entirely open.

To avoid softening of the structure of the cylinder due to perspiration, particularly in warm weather, holes of 5 cm. diameter can be drilled through the supporting belt which at the same time makes the pilon lighter.

The cheapest form of wooden frame is a short cylinder 5 to 10 cm. long and 5 to 7 cm. in diameter according to site of amputation, with two bars of different length on either side of it. These are fixed to the former by screws, and the "heel" can be covered by a circular rubber heel or a piece of leather.

Short stumps of the thigh require a long outer wall of the pilon, and good fixation to the trunk by means of a lateral bar of iron. I have a special design of articulation which has not yet been tried in this service. For short stumps of the leg good results are usually achieved by making a secondary cylinder for the thigh and fixing it to the lower one by a bilateral articulated piece opposite the knee.

Patients fitted with pilons are allowed to walk, using walking-sticks, and in a short time they recover good co-ordination of movements and muscular power of the stump, getting about without any manual means of support. In cases requiring extension of the soft parts this can be applied to the lower end of the pilon by means of an india-rubber tubing. (Fig. 2.) When the patient goes to bed it can then be applied to the weight as in the usual cases. The photographs reproduced elucidate the pilon better than any detailed account.

These temporary pilons cost very little, and as a rule last for a very long time. When the stump gets thinner the bucket can be made to fit the thigh better by a thin layer of felt conveniently applied on its inner surface. The appliances save time, give great moral comfort to the patients, and in the long run save money, not only as regards the fitting of the definite artificial limb, but also in diminishing the period of in-hospital treatment. In a word, they make the cases more anatomical in a shorter period of time. I have a similar device for the upper limb which has not yet been tried in this country.

My thanks are due to Lieutenant-Colonel E. Goodall, officer in command of the Welsh Metropolitan War Hospital, and Lieutenant-Colonel Lynn Thomas, C.B., C.M.G., consulting surgeon, who introduced the pilons into the hospital, and to Mr. Geary Grant, the surgeon, whose cases kindly were given to me for the carrying out of the work.

A CASE OF

PHARYNGEAL DIVERTICULUM.

BY JAMES McCLURE, M.D. GLASG., F.R.C.S. ENG.,
ASSISTANT SURGEON, LONDON TEMPERANCE HOSPITAL.

I DESIRE to draw attention particularly to two points of importance in the diagnosis of pharyngeal diverticulum. In the first place, in a suspected case, where a negative radiographic examination has taken place, undue weight should not be attached to this, but further examinations should be carried out subsequently and attempts made to imitate the average consistency of the regurgitated material in preparing the opaque meal. Secondly, though the natural secretion from the mucous membrane of the pharynx and œsophagus is alkaline, yet food retained in a pharyngeal pouch may rapidly decompose, and a strongly acid reaction therefore should not lead one to conclude that the regurgitated food must have come from the stomach. The acidity in the following case was due to lactic and not to hydrochloric acid.

A. B., aged 44, consulted me on Feb. 8th last on the advice of his medical attendant. He stated that, at intervals varying from 2 to 24 hours after swallowing food, regurgitation of small particles took place into his mouth. This was painless, unassociated with effort or nausea, and had occurred at irregular intervals over a period of at least three years. In addition, for the last two or three months he had been troubled occasionally with "sour mouthfuls" and a bad taste in his mouth. His doctor told me that he had been radiographed for a pharyngeal pouch with negative results, that the regurgitated food had invariably been found to be strongly acid, and that after the passage of bougies under an anæsthetic a diagnosis of œsophageal spasm had been offered by the surgeon who saw him at that time.

Previous history.—He had had no previous illness of any importance, gave no history of syphilis, and had always led a careful and abstemious life; but he worried about trifles, he said, and remarked that his present disability was more pronounced when he had had more worry than he could "shake off." His teeth, which had always been bad, were extracted nine years ago and replaced by dentures. Even then, however, he never masticated his food thoroughly, and especially during the last two years he used to bolt his food in consequence of increased work and hurried meals.

History of present condition.—During the winter of 1914-15 he had been singing more than usual, and in his professional capacity had put such an extra strain upon his voice that he had to consult a laryngologist about a dry and painful throat. On that occasion he spoke for the first time to any doctor about the return of food into his mouth. He did so because he felt there was some "slight stoppage just behind the throat," and thinking this stoppage and the soreness of the throat were due to one and the same cause he concluded that the throat examination would show what was wrong. Under treatment his throat symptoms improved, but the regurgitation of food persisted. As this was painless, he waited till May, 1916, when a recurrence of throat trouble made him consult his doctor, who told him that he probably had a pharyngeal pouch and advised him to see a surgeon. He did so, and after examination was told he was suffering from "nervous spasm of the muscle."

Examination.—I saw the patient with his doctor on Feb. 8th. In addition to the history given above, he told me that mouthfuls of a white frothy substance used to enter his mouth with a gurgling noise, especially when he stooped down to tie his shoe-laces in the morning. He had no difficulty in swallowing liquid or solid food; but he felt as though some food "lodged" or stuck at times just behind his throat. He had not noticed that this occurred with his head in any one position more than in another. After a violent fit of coughing or hawking of mucus, food used to regurgitate more freely. Currants, haricot beans, sardine and aperient pills were the most likely to "lodge and come back." In ordinary social intercourse he was always apprehensive of regurgitation taking place accompanied by gurgling noises. Eighteen months ago he weighed 11 st.; his weight was now 10 st. 3½ lb.

External examination revealed no fullness of the neck except for some slight enlargement of the thyroid gland. In examining this a gurgling noise was heard inside the mouth. This was repeated when holding the tongue forward in the course of an examination of the larynx. This gurgling could be heard distinctly some yards away: it lasted about five seconds and was apparently due to the escape of gas from his pharynx; the gas was odourless. A full-sized gum-elastic bougie was passed into the stomach without difficulty, but shortly afterwards the soft tube of a Senoran's aspirator was arrested about 7 inches from the teeth. A provisional diagnosis of pharyngeal diverticulum was given and operative treatment for its removal was advised if X ray examination confirmed the diagnosis.

X ray examination.—The patient was X rayed by Mr. Archibald Reid on Feb. 12th. About 8 ounces of barium emulsion were prepared and specially made of a thicker consistency than usual. While the patient lay on a couch in a semi-recumbent posture he was told to swallow half of the emulsion slowly and in small quanties at a time. Five minutes afterwards he was allowed to get up and was then screened in the right oblique and postero-anterior positions.

In the right oblique position nothing abnormal was seen at first in the region of the pharynx or œsophagus. A bismuth cachet was swallowed and this rapidly traversed the gullet and reached the stomach without delay.

More emulsion was given and in the postero-anterior position a small crescentic shadow was observed behind the tracheal rings. Though the pouch contained but a small quantity of emulsion, the shadow cast by the barium could be seen rising and falling with every effort at deglutition. Sufficient evidence was thus obtained to confirm the clinical diagnosis. It was now possible towards the end of the examination to see the shadow in the right oblique as well as in the postero-anterior positions. A subsequent attempt was made to fill the sac more completely. This succeeded, and Figs. A and B are the appearances seen in the skiagrams. It will be observed that the lower margin of the shadow reaches to the level of the body of the second dorsal vertebra.

Skiagrams showing Rounded Outline and Broad Pharyngeal Attachment of Pouch.

FIG. A.

Postero-anterior view.

FIG. B.

Right oblique view.

Operation on Feb. 18th.—Intratracheal insufflation of ether was carried out by Dr. Howard Jones, and with the assistance of the patient's doctor and Mr. Neil Sinclair the œsophagus was exposed by an incision along the anterior border of the left sterno-mastoid muscle from the sterno-clavicular articulation to the upper border of the thyroid cartilage. A distended anterior jugular vein, which appeared to lie farther from the middle line and to cross below the sterno-mastoid at a higher level than usual, was cut between two ligatures. The sterno-mastoid muscle with the carotid sheath was drawn outwards, exposing the infrahyoid muscles. The anterior belly of the omohyoid was divided, and its nerve of supply

from the ansa hypoglossi was seen entering its deep surface towards the posterior border. Retraction inwards of the sterno-hyoid and sterno-thyroid muscles showed up the pretracheal layer of fascia which was very well marked. Division of this enabled the lobe of the thyroid to be displaced towards the middle line, exposing a cavity in which the finger recognised the vertebræ posteriorly and the cricoid and tracheal rings anteriorly. A strand of fibrous tissue prevented complete retraction forwards of the thyroid. This contained the inferior thyroid artery, which was isolated by blunt dissection. After division of its upper and lower branches between two ligatures complete dislocation forwards of the thyroid lobe was possible. A 10-volt Clar's forehead lamp was found useful at this stage. Embedded in the pale pink areolar tissue of the depth of the cavity a thicker and more substantial-looking structure could be seen distinctly. It was white with rounded outline and proved to be the pouch.

A full-sized stomach-tube was passed into the stomach and left in position till the operation was completed. Alongside this an ordinary gum-elastic catheter was introduced and, guided by the finger in the wound, was coaxed into the diverticulum. This helped to demonstrate its size and rendered easier the separation of the sac, while the stomach-tube acted as a guide for its complete isolation right up to its junction with the pharynx. No inflammatory adhesions were encountered and the pouch was easily freed by blunt dissection from the surrounding tissues. There was no displacement of the carotid sheath and, with the exception of the slight irregularity in position of the anterior jugular vein (noted above) and some enlargement of the lobe of the thyroid gland, no anatomical peculiarities were noted. The œsophagus was freed to some extent from the loose areolar tissue over the longus colli muscle, and in this way the pouch and adjacent part of the gullet were brought as near as possible to the surface of the neck wound. The pouch was more or less globular, semi-collapsed, and about the size of a golf ball. It was attached to the middle of the posterior surface of the pharyngo-œsophageal junction, about the level of the cricoid cartilage. Its communication with the œsophagus was not narrowed down to form an isthmus, but was relatively wide and open, measuring about 1 inch in vertical diameter. No stricture was seen in any part of the œsophagus so far as this was exposed from the cricoid downwards. In isolating the sac some of its contents were expressed into the pharynx, but aspiration of any septic material was effectually prevented by the steady expiratory current of air alongside the intratracheal catheter.

The catheter was now withdrawn from the pouch, and after packing off the cervical tissues with gauze the diverticulum was removed. To prevent any soiling of the wound this was done between two pairs of narrow-bladed clamp forceps, but owing to the tension with which the sac was brought to the surface and to the insecure grip of the proximal pair of forceps the stump of the sac slipped from between the blades and retracted out of sight behind the gullet. Each end of the opening was picked up with a pair of Porrier's forceps, and this made easier the only difficult part of the operation—namely, the introduction of a double layer of continuous catgut suture to close the opening. On account of the depth and narrow space in which one has to work, a Killian's nasal septum needle might prove useful in introducing these sutures in any similar case. The first row of sutures took up the mucosa, while the second buried the first by approximating the fibrous and muscular coat. Finally, two or three points of interrupted suture were inserted, bringing down the lower fibres of the inferior constrictor of the pharynx to reinforce the upper angle of the wound. The wound was cleaned and wiped dry and a medium-sized rubber drainage-tube was placed down to the suture line in the œsophagus and brought out at the lower angle of the wound. The cut margins of the platysma were approximated with interrupted catgut sutures and silkworm gut brought the wound together except where the tube emerged below. With the exception of these silkworm gut sutures catgut ligatures were used throughout. The stomach was washed out through the stomach-tube, and the latter was then withdrawn.

For the first two days the evening temperature registered 100° F. Its highest point thereafter was 99° F. and by the end of the first week it was normal. The drainage-tube was removed on the fourth day and replaced by a light gauze wick, which was discarded on the tenth day. No food fistula developed and the sinus gradually closed down. For the first four days nothing was given by the mouth, which was constantly rinsed with glyco-thymoline mouthwash. During this time salines and glucose were given per rectum, and on the fifth day sterilised milk, raw meat juice, and chicken jelly were allowed. The amount and frequency of oral feeding were gradually increased, when it was seen that no leakage had occurred, and when he left the nursing home for Brighton at the end of the third week he was taking solids easily and with comfort.

I am much indebted to Captain C. Rhodes Harrison, R.A.M.C. (T.), who sends the following histological report of the diverticulum:—

"On section two small ulcers were found each about the size of a threepenny-piece and in the removed position they were in apposition. They showed loss of epithelium, the bases being formed of firm connective tissue in a condition of subacute inflammation. The epithelium throughout was of the type normal to the œsophagus. In no place was there evidence of peptic or other glands and there was no keratin formation. The wall showed a fairly firm fibrous connective tissue with very scanty and isolated groups of muscular tissue."

Mr. John Webster, F.I.C., of the Laboratory of Pathological Chemistry, St. Mary's Hospital, kindly analysed the contents of the pouch. He reports as follows:—

"The filtrate was strongly acid to litmus, but gave no acid reaction with dimethylamidoazobenzene nor with Gunzburg's reagent. The acidity was due not to mineral acid but to organic acid or acid salts. The liquid gave a marked reaction for lactic acid. On examination for ferment activity I found no evidence of the presence of pepsin or pepsinogen."

Harley-place, W.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

Discussion on the Etiology and Treatment of Iritis.

A MEETING of this section was held on June 13th, Mr. WILLIAM LANG, the President, being in the chair.

The PRESIDENT made touching reference to the demise of Mr. Walter H. H. Jessop, who was at the time of his illness acting as honorary librarian to the Bowman Library and had expressed his intention of making the library as perfect as possible. Owing to the generosity of Mrs. Jessop the deceased Fellow's books had become part of the library, and for this all ophthalmologists had cause to be grateful.

In initiating the debate on the Etiology and Treatment of Iritis, the PRESIDENT said that its opportuneness lay in the fact that if Fellows could agree as to the cause of the disease in the majority of cases of iritis they would be in a strong position should it appear politic to advise the proper authorities to introduce such measures as would prevent much ill-health, a great amount of loss of sight, and untold injury to the community. He had ascertained that in 200 cases of iritis in his private practice the various causes occurred in the following percentages: syphilis, 6; gonorrhœa, 12; tubercle, 11; general affections, 8·5; other causes, 25·5; pyorrhœa, 37. At one time, syphilis was regarded as the chief cause of iritis, and probably hospital figures would show an increase on 6 per cent.; but with the modern anti-syphilitic methods he thought it would become the rarest cause, for gummata of iris and ciliary body could be made to melt away without the disorganisation of the eye which was formerly seen. Gonorrhœa was not usually considered so potent a cause, but hospital practice would probably show a higher percentage than 12. Until recently Mackenzie's work on gonorrhœal iritis had remained unimproved upon. Now, however, that the infection had been shown to linger in the genito-urinary system for years relapses could be largely prevented by local treatment applied in that region. Other sources of infection might complicate the cases of iritis, such as pyorrhœa, and produce relapses. The tuberculous cases of iritis were equally divided between the sexes, and the average age of the patients in this form was 25 years, all but two being between 16 and 35 years of age. The treatment of tuberculous iritis, as for tubercle of the lung, appeared to be good air, graduated exercise, and food rich in fats, as well as such local measures as would subdue inflammation and prevent closure of the pupil. Of the cases 17 were associated with gout, diabetes, herpes of the fifth nerve, influenza, and pneumonia. Ten patients had some septic focus on the skin or on a mucous membrane or cavity. In 6 cases there was disease of tonsils, and 23 patients had an affection of the alimentary tract, while 7 had a diseased condition of the genito-urinary system. One case followed a smart blow on the eye, and another patient had iritis as a sequel of sympathetic ophthalmia.

In no less than 74 of the 200 patients the sole cause found was pyorrhœa. When these cases were seen early and the offending stumps or teeth were removed the clearing up of the iritis was strikingly rapid. Of the remaining cases 22 had pyorrhœa in association with other diseased condition. In the cases in which pyorrhœa alone was found there were twice as many women as men. Of the total number 48 per cent. had their mouths affected, and it would be of great value if members of the dental profession could recommend a preventive of this appalling state of affairs, which seemed to lay the foundation for numberless diseases involving all parts of the anatomy, including the eye.

Sir ANDERSON CRITCHETT directed his remarks to the treatment of iritis. Forty years ago Sir John Tweedy made the suggestion that in many cases where atropine proved ineffective the sulphate of duboisine was a more powerful mydriatic, and in some cases he had found that where atropine was practically powerless he had been able to break down synechiæ with the more powerful drug. It was never necessary to use more than 2 grains to the ounce, the equivalent of 6 or 8 grains of atropine. It must not be allowed to pass down the duct into the throat. Leeches he still regarded as very useful in the early stages. Gonorrhœa was admittedly a frequent cause of iritis. He quoted the opinion of the late Mr. Nettleship as to the real good conferred by iridectomy in some cases of iritis, but the procedure was contra-indicated in keratitis punctata, chronic thickening of the iris with very extensive synechiæ, and the existence of myopia. Mr. Nettleship considered it a mistake to reserve that procedure until all other plans of treatment had been patiently tried. In his (Sir Anderson Critchett's) own experience few things had impressed him more than the extraordinary value of iridectomy both as a preventive and as a curative agent in the cases for which it was specially appropriate. But it must be a good iridectomy.

Mr. J. G. TURNER discussed the subject from the standpoint of the odontologist, and referred to the work he did with the late John Griffith in trying to trace the relationship between dental sepsis and eye diseases, based upon the observed connexion between gonorrhœa and iritis. Probably the causal agent was an infection by means of the blood stream or lymph stream, either toxic or, more probably, actually microbial, and seldom by direct continuity of tissue. Only seldom was a mouth seen which was free from the possibility of infection, and even when the last tooth had gone and a plate was substituted the danger had not gone, for an artefact factor was introduced in the production of dental sepsis. When the periodontal sulcus was infected it was a practically undrainable area. When sticky food was eaten the area referred to close to the neck of the tooth was not cleansed, and a nidus was thus formed for the multiplication of germs. A second source of sepsis was by caries and a septic tooth. A dead tooth always was septic so long as it remained in the mouth. A German investigated a large number of dead roots, and he did not find one which was aseptic. There was nothing which would penetrate and follow up the minute canals of the dead root. "An eye for an eye and a tooth for a tooth" might stand, but a tooth for an eye was a bad bargain. Tooth-cleaning, to be really effective, should be taught by an expert. Most of the ordinary cleaning was futile, because it did not reach the gum edge; the lingual surfaces of the teeth were practically untouched. Much might be done in the way of prevention by avoiding sticky foods. He had looked through the skulls of various races and various ages of mankind, as well as skulls of animals, and they followed the one rule: Where the food was sticky, starchy, and sugary, decay and pyorrhœa were found; where the food was only meat, neither decay nor pyorrhœa existed.

Dr. H. LYON SMITH said he had been working at the causation of arthritic conditions for eight years, and the evidences which he had obtained that bacteria, or their toxins, were the chief causes of arthritic trouble were derived by studying vitiated conditions of blood, most of which he believed were brought about by bacteria. The toxins and the bacteria prepared the ground; it was the element of strain or injury which determined the site. Therefore he had considered it sound practice to recommend every arthritic person to have his refraction carefully tested by an expert, for he believed many cases of iritis might be prevented if eye-strain were avoided. It was long supposed that tubercle bacilli, gonococci, and the syphilitic virus were the only organisms capable of setting up iritis; but the bacteria of pyorrhœa and those concerned in nasal catarrh, bronchitis, colitis, urethritis, salpingitis, &c., were all equally capable of producing it. In August, 1915, he published a paper describing a test by direct hæmolysis as a method of detecting bacterial toxins in the blood, and he was not aware that the statements he then made had been contradicted. He examined the blood of 450 people, most of them suffering from chronic rheumatism or gout. In 8 iritis was a secondary trouble. In 4 of the cases the influenza bacillus or its toxin was answerable, in 3 the tubercle bacillus, and gonorrhœa in only 2 cases. The toxins of streptococci and staphylococci were present in all the 8 cases, and in 3 *B. pyocyaneus*, which latter was a very depressing organism and was a common inhabitant of the alimentary tract. The bacillus of influenza elaborated a great variety of toxins, many of which were specially prone to attack nerve tissue. He believed iritis was a not infrequent sequel of a severe attack of influenza. In treatment strong bodily reactions by means of injections must be avoided when the eye was involved. For example, when using tuberculin a commencement should be made with something less than 1/250.000th of a mgm. He had heard such a dose spoken of scornfully as too small to give an effect either way, but experiments with colloid mixtures showed definite effects from even billionth dilutions.

Captain A. W. ORMOND, R.A.M.C., thought Mr. Turner's contentions proved rather too much, for on his thesis iritis should be much more common than was the case, especially in out-patient ophthalmic practice, where the general run of mouths was deplorable. Did rheumatic fever produce iritis at all? He also asked for a scientific definition of gout. He did not think it possible that errors of refraction and eye-strain could cause iritis. An important point was as to the duration in an active stage of the gonococcus in the tissues; it had been said that it remained in the crypts of the prostate for 15 or more years, but that did not coincide with other statements. He found leeches very useful for iritis, but they were difficult to obtain. He found great comfort was obtained by the continuous application of the electric coil.

Mr. ERNEST CLARKE believed that a point of strain or traumatism was the point for the manifestation of gout when it was in the system. If the metatarsal joint was defective gout manifested itself there; if eye-strain were present, iritis would probably occur. He always tried correction of the latter before recommending iridectomy.

Dr. C. E. LAKIN said he could not remember an instance of a toxic case being associated with a local outpouring of inflammatory fluid. He strongly supported the view that in iritis a microbial infection was at work, due to an embolic process. He believed the reason the iris was affected was that at the junction of the iris and the ciliary body there was a change in vascularity from a highly vascular to (comparatively) an avascular arrangement, the latter containing less hæmoglobin and less oxygen, and hence organisms were able to flourish there.

Mr. LESLIE PATON related a case in which he was able to derive proof that the eye condition was directly due to the foul condition of a tooth stump. The case started as one of deep keratitis profunda, and iritis developed later.

The PRESIDENT replied on the various points raised.

DONATION TO DUNDEE ROYAL INFIRMARY.—At the annual meeting of the Dundee Royal Infirmary held on June 11th the chairman stated that the total expenditure for the year was £27,362, and the deficiency on the year's working was £10,089. This deficiency has been wiped off by Mrs. Marryat, of Belmont, sister of the late Sir James K. Caird, Bart., and the directors expressed their sincerest thanks to that lady for her great kindness. A further donation of £210, and legacies amounting to £250 were also intimated.

THE LATE DR. WINSLOW ANDERSON.—The death occurred in May in New York of Dr. Winslow Anderson, at the age of 57, who was for many years the editor of the *Pacific Medical Journal*. Dr. Anderson, who graduated at the University of San Francisco in 1884, later took the English double qualification, and proceeded to the Membership of the Royal College of Physicians of London. He was originally interested especially in pharmaceutical chemistry and materia medica, but later became professor of abdominal surgery and gynæcology in the College of Physicians and Surgeons of San Francisco, over which institution he was presiding at the time of his death.

Reviews and Notices of Books.

On Causation, with a Chapter on Belief. By CHARLES A. MERCIER, M.D., F.R.C.P., F.R.C.S. London: Longmans, Green, and Co. 1916. Pp. 228. Price 4s. net.

Dr. Mercier has a happy gift of infusing a strong vitality into every subject on which he writes; he possesses, moreover, many of the qualities of the first-class critic—namely, an incisive and entertaining literary style, a habit of going straight to the main points, and a mortal animosity towards all forms of pedantry and humbug. In his latest work all these characteristics are displayed to their fullest extent. Dr. Mercier has—one would almost think intentionally—looked round for the dullest and driest science he could find; he has pitched on logic, and seems to take a malicious satisfaction in re-animating that venerable study and in directing his shafts of criticism against its orthodox exponents. To admire Dr. Mercier's virility of method is, however, a different thing from endorsing all his conclusions. We venture to think that the main value of the book lies in the clean drive through the pedantry with which logic has been surrounded; the inherent heterodoxy or even iconoclasm; the freshness of its point of view. Dr. Mercier ignores or ridicules most of the work of his predecessors: his doctrines should cause the disciples of Aristotle to groan in their tombs. It often happens, however, that those who entirely cut the painter as regards the past, while gaining much in originality and vigour, lose somewhat in solidity of foundation. Dr. Mercier has not altogether escaped this danger. He begins by examining the theories of causation advanced by Hume, Mill, Welton, Professor Karl Pearson, Mr. Bertrand Russell, and Dr. McTaggart. After stating in turn the views of each, he proceeds to demolish them all with satirical impartiality. As regards such of these authors as are still living his criticisms are often cogent and sometimes appear unanswerable. But we do not think he fully appreciates the strength of the positions occupied by Hume and Mill, nor, indeed, by Mr Russell, with whose works Dr. Mercier does not seem to be so well acquainted as he is with those of his other victims. Dr. Mercier condemns all theories of causation which reduce it to the elementary factors of antecedence and consequence. There is something more, he thinks, in the relation of cause and effect than mere invariability of association or succession. He drags in the conception of "Power" in the cause, which compels the effect to follow. A cause, he holds, is something more than appears on the surface; it contains an active principle—though Dr. Mercier does not use the word—which renders the effect inevitable. In this conviction we may see an analogy with Dr. Mercier's views on vitalism. While in physiology he is prepared to believe that there is some "vital" agency which enters into the working of the organism and removes it from the sway of material and physical laws, so in logic he roundly affirms something of a metaphysical nature in the cause by which the effect is produced. The subject is thus linked up with wider philosophical tendencies, and agreement or disagreement with Dr. Mercier is likely to depend on the general school of thought to which the reader belongs.

After full discussion of the theory of the subject, Dr. Mercier comes to the practice. He illustrates the need for a clear and correct concept of cause by reference to the official publications on the causes of death and insanity. He has no difficulty in showing the extreme vagueness of these statistics, consequent upon inadequate definition of what is meant by cause. "The old legal maxim says that fraud lurks in generalities," and, as Dr. Mercier well adds, "to the uncritical it often seems that safety lies in generalities." He devotes an acute chapter to "Methods of Ascertaining Causes," and insists with truth that, if the rules there laid down were followed, the identification of many causes of insanity would be facilitated. Among the most interesting chapters in the book to the average reader are that dealing with "Errors in Attributing Causation," and the final chapter on "Belief." Throughout the work Dr. Mercier lightens and strengthens his arguments by a remarkable power of illustration and analogy. Though it cannot be anticipated that the book will give any satisfaction to orthodox logicians, yet it is one that they can scarcely pass by without some definite reply. At any rate, such silence would be fairly construed as a confession of weakness.

Notes on Military Orthopædics. By ROBERT JONES, C.B., F.R.C.S. Edin., &c., Colonel, A.M.S. London: Cassell and Co. 1917. Pp. 132. Price 2*s.* 6*d.* net.

As Sir Alfred Keogh remarks in his introductory note, the publication of this book is most opportune, and the long experience and reputation of the author its best recommendation. The volume, tersely but lucidly written, will be cordially received by military surgeons, who will find in it the practical application of orthopædic principles to the treatment of war injuries. In a few sections, each concerned with one of the main problems of military orthopædic surgery, a large amount of helpful instruction is imparted. The chapters dealing with the disabilities of the knee-joint and with bone-grafting are specially useful. Himself the champion of the manipulative school in the treatment of fractures, Sir Robert Jones emphasises the utility of efficient mechanical measures; when open operation is rendered absolutely necessary by the occurrence of faulty or deficient union he employs bone-grafting in lieu of plates and screws. He holds, by the way, that the latter methods require less surgical skill than does the carrying out of the technique of bone-grafts.

The omission of a special chapter dealing with the treatment of stiff joints by manipulation, or so-called bone-setting, is, perhaps, unfortunate, seeing how extensively these methods are at present being applied by orthopædic surgeons in military hospitals.

Traitement et Restauration des Lésions des Nerfs. By Mdme. ATHANASSIO-BENISTY. Paris: Masson et Cie. 1917. Pp. 179. Price 4 francs.

ISSUED as a sequel to the same author's "Formes Cliniques des Lésions des Nerfs," lately reviewed in this journal, this volume, with a preface by Professor Pierre Marie, is devoted to a full exposition of the methods of treatment of injured nerves and of the consequent paralyses, by surgical and mechanical means. A chapter is also given to the symptoms indicating serious injury to the nerves. Taken together the two volumes give an excellent account of the new knowledge of nerve injuries acquired during the present war.

New Inventions.

THE LUC QUARTZ GLASS SYRINGE.

WE have received from Messrs. Allen and Hanburys, Limited, Wigmore-street, W. 1, a glass syringe which possesses the practical merit of withstanding sudden and extreme change of temperature occasioned by any form of sterilisation. The instrument, of which we give an illustration, is called the *Luc* and is made of fused quartz glass, being so constructed that it is unnecessary to separate the parts before sterilisation. The complete syringe may be

placed in boiling water without fear of breakage, distilled water may be drawn up into it and boiled over a flame, or hot oil at a high temperature drawn up. The only precaution required is to withdraw the piston from the barrel into the metal container attached to it in order to prevent the glass barrel, which does not expand when heated, being broken by the expansion of the metal piston within it. The apparatus, its metal case, and a needle-holder can also be sterilised as a whole by dry heat, thus preventing any risk of rusting either the case or the needles. The price of the syringe varies, according to the size and accessories, from £1 10*s.* to £3.

THE LANCET.

LONDON: SATURDAY, JUNE 23, 1917.

The Treatment of Septic Wounds.

SIR ALMROTH WRIGHT possesses uncanny skill in investigating physiological processes, in devising ingenious experiments to discover the defensive powers of the body, and in initiating, on the conclusions which are drawn from these experiments, therapeutic measures new in direction and valuable in result. He has not contented himself with the work he has already done, and been busy merely with elaborating or perfecting it, as might be hastily assumed from his recapitulations; his labour has been progressive, the common direction of his energies being the obtaining of a perfect method of treatment of infected wounds. In the present number of THE LANCET he has set forth the conclusions at which he has arrived to-day; the basis of his address was delivered some weeks ago at the Royal Institution, since when he has had opportunities of adding to his message in numerous particulars.

The address is a piece of straightforward arguing, which deserves close reading. To appreciate fully the basis of fact on which Sir ALMROTH WRIGHT has founded his methods, we must recognise that the natural defensive power of the body against microbic invasion is twofold: it depends partly on the phagocytic action of the leucocytes and partly on the destructive action of the effused serum. The power possessed by the serum is of vast importance, and is closely associated with the power of normal blood serum to neutralise the digestive ferments and especially trypsin; and certain experiments, which are reported, indicate that it is this antitryptic action which enables the serum to inhibit the growth of septic micro-organisms. The phagocytic action of the leucocytes is a process whose significance has now passed into common pathological knowledge. But before the leucocytes can engage invading microbes they must have migrated from the capillaries. This preliminary action of resistance can be stimulated, for certain substances applied to the surface of a wound have the power of increasing this emigration, just as other substances can reduce the diapedesis to a minimum. For instance, a weak salt solution favours the migration of leucocytes, but a 5 per cent. solution of salt will reduce it greatly, while in the presence of gross sepsis the resisting movement is brought almost to a standstill. Another feature in this elaborate physiological process is brought to attention by Sir ALMROTH WRIGHT. Septic wounds can be divided into what he terms "live spaces" and "dead spaces." In a live space the tissues are well supplied with blood; there is an abundant flow of antibacterial lymph and the terrain is suitable for phagocytic action. In a dead space the tissues have been bruised and cut off from their blood-supply, so that the serum and the leucocytes can only act in their different ways at a serious disadvantage. The infection quickly spreads into neighbouring tissues, toxins are absorbed, and the patient has septic fever. An abscess cavity is, of course, the typical dead space. The application of knowledge of this kind, gained by laboratory experiment, to the treatment of septic wounds follows clearly enough, whether we are dealing with old-established principles or a new technique. The first point in the treatment of an infected dead space must be drainage, and every portion of a wound which would, if left to itself, become a dead space must be laid open. Then comes the treatment of the infected walls, and with regard to the extent of infection we have to remember, and remember always, the conditions of war. Often it must happen that hours or days elapse before the wound comes under the surgeon's hand. An infected wound if left to itself grows dry, in which case the capillary circulation will cease and there will be no outflow of bactericidal lymph, while there will be an enormous increase in the growth of septic organisms; thus sloughs are formed and the sepsis tends to spread. This drying process will go on during the transport of the wounded if no salutary interference is forthcoming. But should the wound be simply kept moist there will follow a great increase in the number of microbes, the leucocytes poured out will die, and the tryptic ferment set free will exert an erosive action on the walls. Again the infection tends to spread. What shall be done, then, to wounds during transport when they cannot be dressed? Sir ALMROTH WRIGHT answers this question with an illuminating account of the investigation into the action of antiseptics in living tissues. He shows that the influence of an antiseptic applied to the interior of a wound is bound, in ordinary circumstances, to be superficial, and that frequent re-application of an antiseptic during transport will fail of the desired effect; whereas the employment of a suitable hypertonic solution will favour the outflow of lymph and so drive back the invading microbes. The routine of treatment at the hospital, which all these researches lead up to, is no new thing. The wound has to be made clean, and this can be accomplished by thorough drainage and the use of hypertonic salt solution, which both assists to remove dead tissues by a process of cleansing digestion, and at the same time causes an increased flow of lymph to combat the infection itself.

Sir ALMROTH WRIGHT'S address closes with an instructive discussion of the use of Dakin's solution and of the Carrel method. So far as Dakin's solution is concerned, the conclusion is reached that it has little antiseptic power, which is quickly lost by evaporation, and then its action is physiological, and the outpouring of lymph and leucocytes goes on. With regard to the Carrel method, Sir ALMROTH WRIGHT argues that it cannot act by completely sterilising the wound; but he regards the procedure as of extreme value, for it furnishes

a new and improved technique for physiological treatment of an infected wound, while he considers that its success depends very little on the antiseptic action of Dakin's fluid. The author has spared neither pains nor time in the investigation of a very difficult and important subject, and the address must be read closely, if the basis of the arguments is to be fully realised.

Depopulation and the Endowment of Motherhood.

THE smallness of the birth-rate in France is a familiar topic to which the war has added a new and poignant interest. In the *Revue d'Hygiène* for April–May, 1917, appears the report of a small commission on depopulation in France, regarded from a physiologico-medical point of view, presented by Professor CHARLES RICHET to the Academy of Medicine. The facts are well known, but bear repetition in the striking form in which Professor RICHET presents them. The annual number of births, which in 1876 slightly exceeded 1,000,000, had fallen in 1913 to a little over 745,000, and the proportion per 10,000 of population from 210 in 1910 to 172 in 1911. As is usual with a low birth-rate, infant mortality also stands at a low figure, but, as Professor RICHET points out, no decrease in the infant mortality rate can compensate for such a fall in the birth-rate. While at the end of the first year of life in Russia, for example, taking the birth-rate at 465 per 10,000 inhabitants, against one of 200 in France, the 465 babies might have been reduced to 372, a larger proportion of the 200 French babies would survive, and yet the total number not exceed 180. The low birth-rate is present in all sections of the community, urban and rural, rich and poor, worker and intellectual alike. The drop is, in fact, common to all European nations, but greater in France than elsewhere. Taking the birth-rate in each country for the decade 1841–50 as the standard and calling it 100, the rate in the decade 1901–11 was only 74 in France, compared with 84 in England and Sweden, 89 in Austria-Hungary, and 92 in Germany. For every additional Frenchman per year there were 70 Russians and 200 Europeans. In France it would take 370 years to double the population, whilst in Germany a century would see the number of inhabitants trebled.

Whilst many causes such as the emigration into towns, alcoholism, the effect of the civil code and of increasing irreligion have been called in to account for some share at least in the diminution, the prime cause is undoubtedly, Professor RICHET assured his hearers, the sterility or, more correctly, the non-fecundity of marriages, 15 per cent. of which are absolutely sterile, the remaining 85 per cent. of parents limiting the number of their offspring to an agreed figure. Certain districts of Paris of a higher social class have a still smaller birth-rate than more populous parts of the city, but there is no doubt that all classes have adopted neo-Malthusianism as their family religion. In 1891 a family with seven children or more was a rarity in Paris (1·3 per cent. of the total number of families), and even in the country the proportion in the last Census year (1911) did not exceed 3 per cent. Professor RICHET'S Commission holds that argument is likely to be fruitless, inasmuch as the smallness of the family in France is a question of economy and foresight. A child up to the age of 15 years costs the family exchequer at least 400 francs per annum, representing one-sixth part of the average paternal earnings. Three children would account for half the income, and are therefore the extreme limit for the prudent wage-earner. The only practical remedy, states the Commission, is the endowment of motherhood by an allocation commencing from the moment that pregnancy becomes certain and lasting to the end of the first infancy, a period defined by the eruption of the twentieth tooth. The Commission holds, indeed, that families with no or few children should pay for those who have many, and regards 2000 francs a head as a very moderate price for the country to pay for a potential Frenchman.

We began by saying that the fact of the decreasing birth-rate was well known in France. It is also well known in this country. But opinion on this side of the Channel is widely divergent on the best way of dealing with the relative depopulation. Professor RICHET'S solution was evidently acceptable to a majority of his hearers at the Academy of Medicine, who are said to have warmly applauded his concluding remarks. In the discussion which followed it was left to a single speaker, M. BARRIÉ, to query where the revenue was to be found to provide for the endowment of motherhood. But the idea of a State subsidy for large families and of State assistance for the young children of widows is no new one in France, and is leading on there, as it has done in America, to the provision of child pensions as a matter of ordinary State policy. Judge HENRY NEIL, of Chicago, who is now in this country on a mission to popularise what is practically an endowment of motherhood, states that pensions to widows with young families to bring up are already given in 27 out of the 48 States, one State at least granting them—as Professor RICHET also proposes to do—to mothers irrespective of their civil state. In the States where the provision is in force the maintenance is granted in respect of all children under 14 years of age, ranging from 7½ to 10 dollars a month for each child. An advocate of the scheme points out that whereas it costs a hundred dollars a year to support an orphan by the pensions system, it has cost the State an average of three hundred dollars a year to support a child in an institution. The war is familiarising the whole civilised world with the notion of endowing motherhood in one form or another, and more is likely to be heard of it.

THE NATIONAL BABY WEEK.—A "Richard Burbidge Fund" will be opened at Harrod's Stores on July 2nd, and during the National Baby Week it will welcome every offering, however small. The late Sir Richard Burbidge was the chairman of the Finance Committee of the movement and the fund is intended to memorialise his interest in the work.

Annotations.

"Ne quid nimis."

THE CROONIAN LECTURES.

IN the second Croonian lecture[1] at the Royal College of Physicians of London Colonel J. G. Adami dealt with the difficult subject of adaptation in bacteria, and the consequent evolution of disease. After indicating the absurdity of thinking that the infectious diseases now known to us have afflicted man from his first appearance on the planet, he pointed out that if bacteria have been present from the beginning of the world, this would not imply that the specific infections have been in existence for the same period, for zymotic phenomena must run parallel with geological, which teach differently. The reason why we cannot recognise the descriptions of epidemics given by classical authors is not necessarily that they were incapable of noting characteristic symptoms; more probably they described conditions no longer existing. It is known that in more recent times infections have come and gone. The tritest example is the sudor anglicus, or "sweating sickness," but many diseases have made their appearance in comparatively recent times—e.g., diphtheria, cholera, syphilis. Here Colonel Adami warned his audience that a second principle may have to be considered. Certain of these diseases may have been present for an indefinite period endemic in a particular locality, and then with the opening up of trade routes have spread rapidly. Admitting this, the conclusions reached by a study of the geographical distribution of animals and plants must also be admitted—i.e., where a species (such as the rabbit or sparrow) when introduced into another continent shows an immediate spread—the fact that it was not there before forms an indication that the spread had arisen at a period subsequent to the separation of one continent from another. Whichever side was taken in the syphilis controversy, said Colonel Adami, it had to be confessed that this disease was non-existent in early Egypt or in the Rome of the time of Galen.

The Croonian lecturer's picture of the evolution of an infection is very interesting:—

> "If every infection is due to the diffusion through the body of the toxins of one or other particular species of micro-organism, it deserves note that pathogenic microbes do not form an order by themselves, but, on the contrary, are singularly diverse in their affiliations. With scarce an exception every genus of micro-organism has its representatives among the pathogenic microbes, or, conversely, every pathogenic microbe has closely related forms differing from it in little beyond the fact that the one is virulent, growing in or upon the tissues, the other non-virulent. Next, these closely allied species are found suggestively either growing in the cavities and on the mucous surfaces of the body, or in the water and foodstuffs taken up by the individual. This state of affairs in itself strongly indicates that at some period or other pathogenic microbes have originated from those saprophytic on the body surfaces or existing in the foodstuffs. This natural deduction has been opposed notably by the German school of bacteriologists, with the late Robert Koch at their head, who stood out for the fixity of bacterial species."

In studying bacteria two apparently opposite and contradictory facts are to be made out: on the one hand they are extraordinarily conservative, but on the other there are certain changes of environment which lead to certain and definite modifications in the properties of bacteria, the orders of variation being usually given as three—fluctuations, mutations, and impressed variations or modifications. Colonel Adami brought evidence forward to show that in the bacteria at least what are usually considered as mutations, or chance variations, are in truth impressed variations due to specific alterations in environment. Whereas under the ordinary conditions of experiment certain members only of a bacterial colony take on the property of fermenting a foreign or new foodstuff, this condition of experiment can be so altered that all the members of the colony with absolute precision can be made to acquire this new property. The experiment can be so arranged as to demonstrate that here is no question of chance variation, of the survival of those forms, and those forms alone, which have exhibited variation in a favourable direction—no question, that is, of survival of the fittest—but that there is, within certain limits, direct adaptation in the Spencerian sense, direct equilibration between the organism and its environment. Certain experiments recently conducted by Major F. B. Bowman, C.A.M.C., with the typhoid bacillus, proving this point, were given in detail, and similarly, as an example of variation by loss of factors, there is the classical experiment, ever quoted, of Pasteur and his lieutenants, Roux and Chamberland, in which by exposing any culture of the anthrax bacillus over a given period to a given temperature of growth with absolute precision the power of the spore production is lost, and now for years—and thousands of bacterial generations—grown under ordinary conditions spore production does not manifest itself. Now if this be true of other properties, it must be true regarding virulence, and we have methods by which we can exalt or depress the virulence and pathogenic properties of bacteria, while we can take harmless non-pathogenic bacteria and with absolute precision, and not by chance variations, convert these into highly pathogenic virulent forms. It is this direct adaptation, evidently, that explains the origin of the infections.

[1] A summary of the first Croonian lecture was published in THE LANCET of June 16th (p. 921).

INCIDENCE OF INFECTIOUS DISEASE IN 1916.

THE report of the Medical Officer of the Local Government Board on the incidence of notifiable infectious disease during the year 1916 has now been published and contains, as always, much information of vital interest as to public health. As in previous years, the rates of infectious sickness in each thousand of the several populations are given in the local tables for 1916. The returns indicate that a considerable proportion of the cases were imported from abroad, having been notified at the seaports, which are therefore especially exposed to danger. In England and Wales only 4 cases of typhus fever were reported last year, as compared with 45 in the year preceding. Scarlet fever was notified in 75,722 instances, or fewer by 51,364 than in 1915; diphtheria in 51,707 instances, or 1890 fewer than in the preceding year; enteric fever in 5564 cases, as compared with 6364 in 1915 (in 17 instances paratyphoid was specifically mentioned). 1996 cases of puerperal fever were notified, against 2057 in 1915; 18,520 cases of erysipelas, as compared with 23,382; 1306 cases of cerebro-spinal fever, against 2566

in 1915; 689 cases of acute poliomyelitis, against 517 in 1915. Small-pox was reported, sometimes erroneously, in 149 instances last year, 55 of them being notified from places connected with seaports. The cases reported in 1916 were more by 59 than those reported in 1915. It will be noted that, with the exception of the two last, all the principal infectious diseases are reported to have been less prevalent in 1916 than in the year immediately preceding. Since 1911 the incidence of pulmonary tuberculosis has been notifiable throughout the country. In terms of population the disease was apparently observed during 1916 in the case of 2·10 per 1000 living, or somewhat more than in the preceding year. The reported cases, however, include a considerable number of duplicate notifications—a fact which must be taken into account in interpreting these rates. The rate was equal to 3·19 per 1000 of the population in London, and to 1·96 per 1000 in extra-metropolitan England.

THE FACTORS OF CARDIAC IRRITABILITY.

Dr. J. Strickland Goodall's Chadwick lecture on the Soldier's Heart, being based on the critical analysis of 2250 cases, and not on mere *obiter dicta*, is worthy of careful consideration. He starts from the postulate that since the heart is composed of both nervous and muscular elements it may become over-excitable as regards either component. Nervous irritability is usually characterised by increased rate, while the rhythm may or may not be affected. He classifies the nervous irritable heart into three groups. The first is the emotional, susceptible, or unstable heart. It is essentially physiological, but reacts violently and excessively to every emotion, such reaction being aggravated by overwork, alcohol, tobacco, and anything which impairs nerve control or injures the general health. The second is the youthful or fretful heart, which "speeds up" during inspiration and slows down during expiration. It is entirely physiological, and should not be regarded as a bar to active service. The third type is where there is tachycardia, either permanently, as in Graves's disease, or periodically, as in paroxysmal tachycardia. He believes that in persistent tachycardia fright or other emotion causes the suprarenal to pour adrenalin into the circulation, and the thyroid exerts itself to neutralise this. The over-action of the suprarenal is temporary, but the thyroid continues to over-act. He regards the first and third of these types as only fit for sedentary or light military duties. Irritability of the heart muscle is indicated by a definite but variable irregularity of the pulse. He believes that the irritable heart of the soldier falls into this category, and that it is begotten by overwork and under-rest. X ray examination shows that hearts which exhibit a persistent over-excitability either of muscle or nerve are too horizontal in position because they are too soft, so that they lie more or less on the diaphragm and may be deformed by distension of the stomach. This horizontal type is found in old age, in sedentary workers who take too little exercise and are often the victims of a chronic toxæmia, after infective conditions, and after long-continued overwork or mental strain with insufficient rest. The tone of any organ depends primarily on two factors, the integrity of the nervous control of the organ and systematic use followed by adequate rest. Lack of tone arises from impaired nervous control, habitual overwork with insufficient rest, or disuse, insufficient use, or misuse. An exhausted tissue or organ is also over-excitable, and hence we find that with atonia there is over-excitability. The whole heart may suffer in this way, or the change may be confined to the auricles or to either ventricle. The right ventricle is affected mainly by overstrain, the left by arterio-sclerosis. Auricular over-excitability is much commoner in soldiers than in civilians, and Dr. Goodall is of opinion that it is a more serious condition than ventricular over-excitability, as it usually passes into some graver condition, such as auricular flutter or fibrillation.

PUBLIC HEALTH WORK FOR WOMEN.

PUBLIC health work affords to-day good openings to well-educated women who have qualified by training. Women can thus equip themselves to become sanitary inspectors, health visitors, superintendents of schools for mothers and similar institutions, relieving officers, lady almoners, lecturers and teachers giving instruction in matters connected with sanitation and health, secretaries to local health societies, and officers in connexion with the carrying out of the National Insurance Acts and the Poor-law. Vacancies in such positions are increasing in number and variety, and although they may not offer all the opportunities that the medical profession holds out to clever and ambitious women, yet they have the compensating advantage of not necessitating a long, exacting, and costly education. A course of instruction is offered by the National Health Society under which a training of from four to six months is given, with a view to fitting students for the posts enumerated, the period of subsequent training necessarily varying in accordance with the intentions of the student. The National Society, in fact, offers itself as an organisation prepared to help its associates, and women generally, by advice in the selection of a particular career, and to provide, so far as it can, teaching, encouragement, and assistance in the obtaining of posts. Miss Fay Ray Lankester, the secretary of the National Health Society, 53, Berners-street, London, W. 1, invites communication with her from women who are desirous of helping their country and themselves by undertaking useful work.

NEURASTHENIA IN SOLDIERS.

LECTURING at the Royal Institute of Public Health on June 13th, Sir John Collie stated the predisposing causes of neurasthenia in soldiers to be the fear of being afraid, want of sleep, and the terrifying experiences. The emotional suppression cultivated by every good soldier added its quota to the state of anxiety predisposing to war-strain. He distinguished three types of neurasthenia: the first stage of mere asthenia or weakness; the more advanced cases with well-marked tremor, extreme nervousness, and loss of weight; and a hypochondriacal class whose self-control had always been subnormal, and unfitted by temperament to be soldiers. In the treatment of the neurasthenic the whole environment should be one of cheerfulness and hope, combined with confident reassurance of complete recovery. Many of these cases, Sir John Collie said, were now treated immediately behind the firing line, where the early application of psycho-therapeutic methods had been signally successful in cutting short attacks. Each

army now had its special shock hospital staffed by selected medical officers. A Special Medical Board for Nervous Disorders, of which he was president, dealt with men discharged for neurasthenia, re-examining them after leaving the service from time to time. This board was in close touch with the local War Pensions Committees throughout the country, and assisted men to obtain work in civil life. Several large proprietors had agreed to employ men recovering from the effects of shell shock on the land, and arrangements were being made to form camps in country districts where the men would be housed during the summer months. The first Home of Recovery had been provided at Golders Green by the British Red Cross Society and the Ministry of Pensions. The Ministry of Pensions had arranged for intensive French culture to be a feature of the outdoor training of the men, a pursuit which, with its comparatively light work, should be specially suitable for large numbers of men suffering from functional nerve disease.

INDUSTRIAL ACCIDENT MORTALITY IN AMERICA.

THE increased insecurity of life during the European War made itself felt in America during 1916 and is seen in the mortality statistics compiled by the Metropolitan Life Insurance Company for their 9,000,000 white policy-holders. The accident rate for the working classes of the United States in 1916 was found to have increased five points per 100,000 living over the rate for 1915, in contrast with the tendency in recent years toward a reduction in the fatal accident rate. The total rate of 73·5 (68·9) included traumatism by fall, 13·7 (12·4); accidental drowning, 9·5 (11·9); traumatism by automobiles, 8·8 (5·7); burns, 8·4 (8·1); traumatism by steam railroads, 7·6 (7·3); and other less frequent causes. The figures in brackets are the corresponding rate for 1915. Accidental drowning alone shows a decrease, chiefly due to the inclusion in 1915 of the deaths in the Eastland disaster. Mortality from automobile accidents and injuries showed by far the largest increase, being responsible indeed for three-fifths of the increase in the total accident rate in 1916. The company attributes the general rise to increased activity in industry and the speeding-up incident to war conditions. It is instructive to see this result proved by figures for a non-combatant country. Probably in every country of the world 1916 was a less safe year to live in.

THE WORK OF ASYLUMS IN EGYPT.

THE official report for the year 1916 of the Lunacy Division of the Ministry of the Interior, Egypt, gives welcome evidence of the steady advance which is being made in lunacy administration in Egypt. Much of the non-medical work has now been taken over by the General Board of Administration, relieving the heads of asylums of an enormous burden and setting them free for their special work. Again this year, as is usually the case, there is an excess of applicants over available accommodation. The two asylums together provide room for 1550 patients, and of the 1516 lunatics notified 970 were admitted, while 575 patients were sent back to their friends uncured but supposed to be harmless. Besides these, 324 British soldiers were treated by Dr. J. Warnock in a small special hospital. Although in itself one man's work, the Criminal Lunacy Department has also fallen to Dr. Warnock, who has tabulated the forms of insanity associated with various forms of crime as well as the special causes contributing to the criminal lunacy. Among the latter pellagra plays a very important part in Egypt; haschish is also a common cause. Careful examination of the Wassermann reaction revealed the frequent presence of syphilis, not alone in cases of general paralysis, but in many other forms of mental disorder. A number of patients were received as voluntary boarders, a gratifying recognition of the nature of mental disorder among native Egyptians. The death-rate was 11·2 per cent. of the average asylum population. Pathological study was carried on in the asylums notwithstanding the war, and dealt chiefly with ankylostoma, malaria, and bilharzia. The associated asylum of Khanka, under the direction of Dr. H. W. Dudgeon, employs many patients on the land, who provide vegetables for both institutions. The report gives evidence of the untiring service of the responsible authorities, of which the award to Dr. Warnock of a New Year honour was a timely recognition.

A STANDARD OF CLEANLINESS.

IN a pamphlet dealing with uncleanliness among elementary school children, reprinted from *School Hygiene* for February last, Dr. A. H. Hogarth, medical officer of health for Buckinghamshire, laments the inability of many school medical officers to understand the elementary principles underlying statistical calculations, and states that no accurate representation apparently exists of the extent of uncleanliness among school children. He mentions the common grounds of statistical fallacy, enunciating four requirements which must be satisfied in examining children for the purpose in view, viz., non-selection, non-preparation, accuracy of examination, and the statement of a standard of cleanliness. For his own county he has adopted a classification into seven groups, each capable of precise definition, starting from (1) clean, through (2) nearly clean—that is, hair not containing more than 10 or 12 nits, or a head, face, and neck in need of washing—and (3), (4) nits only, counted by tens or by hundreds, to (5) few nits plus one or more lice, (6) many nits plus lice, and (7) a dirty and neglected child whose home is to be visited by the N.S.P.C.C. He gives percentage tables of inspections during the years 1912–15, in which at a first inspection the number of clean children progressively increased from year to year, the figures in boys being 75, 85, 94, 96, and in girls 40, 58, 75, 81. Surprise visits are paid by the medical officer to the worst schools reported by the nurses with a view to searching out the persistent offenders and taking them to the police courts. This policy has made itself felt in every parish of Buckinghamshire, there being no subsidiary court which has not tried a batch of such cases, and no local newspaper which has not faithfully reported them. Between January, 1912, and December, 1915, 313 parents were summoned on account of 352 children, and 284 parents were fined from 1*s.* to 10*s.* each. The committee's practice of keeping an exact record of the numbers of nits or lice found at each examination by the nurse has proved most useful in obtaining convictions in court. Statistical accuracy has been more than its own reward.

THE office of the Ministry of Pensions has been removed from Great George-street to Westminster House, Millbank, S.W. 1.

Correspondence.

"Audi alteram partem."

WAR EMERGENCY FUND OF THE ROYAL MEDICAL BENEVOLENT FUND.

To the Editor of THE LANCET.

SIR,—We beg to support the urgent letter of appeal to this Fund which appeared in last week's medical journals. This Fund was instituted by the Royal Medical Benevolent Fund last year to afford assistance to members of the profession who, in consequence of having joined the Army Medical Service, find themselves in temporary difficulties.

We very strongly commend the claims of this Fund to the generous support of both the profession and the public.

We are, Sir, yours faithfully,

FREDERICK TAYLOR, President, Royal College of Physicians.
W. WATSON CHEYNE, President, Royal College of Surgeons.
W. H. NORMAN, Surgeon-General, R.N.,
Director-General of the Medical Department of the Navy.
ALFRED H. KEOGH, Director General, Army Medical Service.
WILLIAM OSLER,
Regius Professor of Medicine, University of Oxford.
THOMAS CLIFFORD ALLBUTT,
Regius Professor of Physic, University of Cambridge.
JOHN TWEEDY,
Late President, Royal Medical Benevolent Fund.

11, Chandos-street, Cavendish-square, W. 1, June 16th, 1917.

*** We publish elsewhere the details of certain cases which have already been relieved by the War Emergency Fund.—ED. L.

EDUCATION OF THE LEFT HAND OF DISABLED SAILORS AND SOLDIERS.

To the Editor of THE LANCET.

SIR,—Under the above heading Dr. C. W. Hutt records, in THE LANCET of April 7th (p. 553), the method used by M. Tamenne for teaching writing with the left hand to men who have lost their right hand. The results achieved are undoubtedly satisfactory, but it will be found that it is infinitely easier to write in exactly the opposite manner, and the reasons will be appreciated when explained.

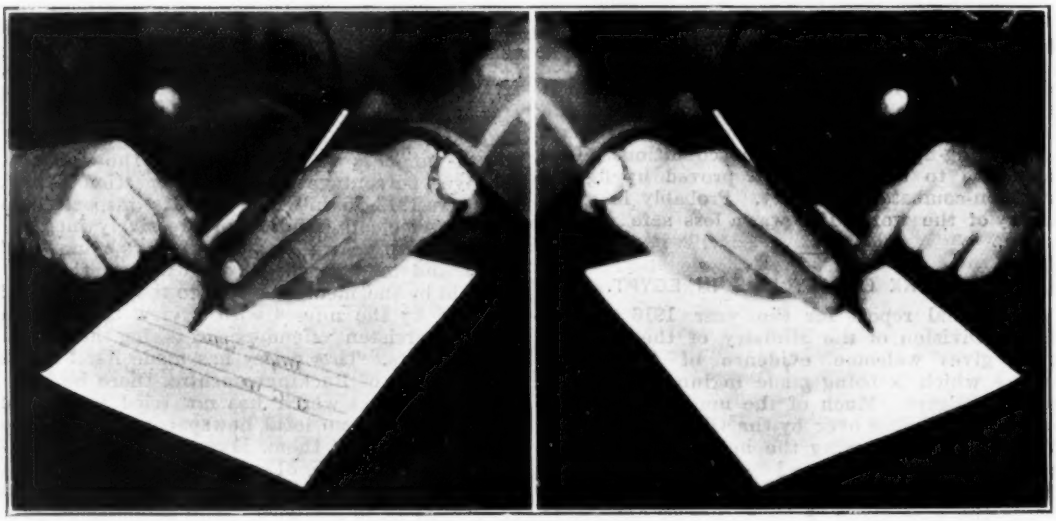
Firstly, instead of the line of the writing sloping up towards the right shoulder as shown in the article of April 7th, the line should be at an angle of about 50° with the edge of the desk towards the right ↘. At the same time the slope of the writing should be backwards at about 45° to the writing line, at least to commence with. In this method it will be found that the fingers are in the most natural position for writing, the arm and wrist being in a straight line, and there being a wide sweeping movement of the wrist if required. It will be found, and can be seen every day with those trying to teach themselves to write with the left hand, that to write straight across the paper—i.e., parallel to the edge of the table—leads to a most cramped position and to great limitation in the movement of the wrist, and that a great deal of the movement across the sheet has to be made with the upper arm.

This difficulty M. Tamenne has experienced, and following his rule (5) "always take care that the hand is immediately below the point where he is writing," he states, "the man will find this difficult to carry out and the effort to do so will tire his hand." Precisely so, because the position is cramped and unnatural. My method I have demonstrated to the men coming before a Medical Board here, and they unanimously declare that it is much easier than the "straight across" method which they try for themselves. If anyone will try the two methods for himself for a short time he will see the difference. I endorse emphatically the importance of not attempting to get on too fast. Also it makes an enormous difference if the teacher can write left-handed. The importance of this I found some years ago, when I was responsible for a boy of 13 who had a right-sided birth palsy. Several schools had vainly tried to teach him to write with his left hand and the result was lamentable. I found that the reason was that his damaged brain could not translate to his left hand the motions shown him by his tutor's right hand. The only remedy was to learn to write with one's left hand, so that he could copy the movements. This I did with an entirely satisfactory result, as he easily copied the movements he saw. The idea of slanting the writing I got from watching a left-handed clerk many years ago.

There is one thing that is important, not to start the men with a broad pen, or they are apt to make blots owing to the reverse way the pen is held as compared with the writing. A fine fountain pen I find the easiest to use.

The reverse print (photograph B) shows how exactly similar the position I describe is to the correct right hand method. Later on, as in ordinary writing, the slope can become more upright; but I am convinced that it is easier to commence in the manner shown.

A B



The photograph A shows the position of the hand and paper when writing with the left hand. Photograph B is a reverse print from the same negative, showing similarity of position to correct right hand method.

I am, Sir, yours faithfully,

ELWIN H. NASH, Major R.A.M.C.

The Lord Derby War Hospital, Warrington.

THE LUMLEIAN LECTURES AND MEDICAL RESEARCH.

To the Editor of THE LANCET.

SIR,—I was much interested in Professor A. R. Cushny's paper on Digitalis in Auricular Fibrillation in your issue of June 9th, especially in view of the recent correspondence in your columns on the Lumleian lectures. Up to the present it has been assumed that the beneficial action of digitalis in auricular fibrillation is due to the blocking of impulses from auricle to ventricle through stimulation of the inhibitory mechanism of the vagus. But Professor Cushny states in his paper—

> That in a number of observations which I made in Mackenzie's wards with Marris and Silberberg we satisfied ourselves that in auricular fibrillation the change in conduction is not inhibitory in nature, for it is not prevented by complete paralysis of the vagus by atropine.

Later on he says—

> We have two types of digitalis action on the heart. ..... The second or anomalous reaction occurs in the auricular fibrillation in man and not in that experimentally induced in animals; here the *heart is slowed by direct action on the muscle* independently of the normal inhibitory mechanism.

In his final paragraph Professor Cushny says—

> Another result of digitalis on the animal heart *is the increase in the strength of contraction*. Does this play no part in the improved efficiency of the heart?

Since the advent of electro-cardiography it seems to me that the neurogenic doctrine has been exalted to a position of undue importance, more especially in relation to so-called auricular fibrillation. The irregularity of rhythm in the ventricle in auricular fibrillation is attributed, as far as I am aware without any sufficient evidence, to the irregular transmission of feeble, incoördinate stimuli from the flickering fibres of the fibrillating auricle, which one would not suppose capable of exciting a contraction in the ventricle. But even admitting this, how can the mere cutting off of a few nervous impulses from auricle to ventricle by itself restore the functional efficiency of a heart muscle that has broken down under stress? Yet that has been the explanation given of the action of digitalis in these cases. It is a great satisfaction, therefore, to find that so distinguished an authority as Professor Cushny has now raised the question as to whether it is not after all increase in the strength of the contraction of the cardiac muscle induced by digitalis, which plays an important part in improving the efficiency of the heart. It is not merely in auricular fibrillation that digitalis is of value. Any clinician knows the extraordinarily satisfactory results obtained from the administration of digitalis in cases of heart failure and dropsy associated with mitral incompetence, even when the pulse is quite regular and there is no question of "auricular fibrillation." Surely the beneficial effect in these cases is due to the action of digitalis in improving the tonicity of the cardiac muscle, so that the dilatation is reduced, the force of the beat improved, and the quantity of residual blood diminished.

In mitral stenosis, whatever may be the case in the valvular lesions, the heart is working at a great mechanical disadvantage. The left ventricle is small, imperfectly supplied with blood, and has comparatively little work to do. The right ventricle hypertrophies on account of the extra work imposed by the steady increase of pressure in the pulmonary circulation due to the narrow nozzle at the distal end in the form of the stenosed mitral orifice. The pressure in the left auricle is also greatly raised and is an important factor in maintaining as rapid a flow of blood as possible through the narrow orifice during diastole. When the right ventricle fails, the pressure in the left ventricle falls and the supply of blood to the left ventricle becomes even more insufficient and irregular. The beneficial action of digitalis in such a case may well be explained by its effect in restoring the tonicity and efficient action of the right ventricle, which is the important factor in maintaining a working circulation. A time must come, however, in severe cases of mitral stenosis at which the almost impassable barrier of the button-hole mitral orifice causes a complete breakdown of the right ventricle, and neither digitalis nor any other drug is of any use in averting the final catastrophe.

To take another point. How is it that digitalis, which has such a beneficial effect in auricular fibrillation, is of no service in paroxysmal tachycardia, Graves's disease, or, indeed, in any other form of tachycardia? If it can arrest impulses from auricle to ventricle with beneficial results, as is postulated in auricular fibrillation, why does it fail in the latter group?

The modern conception of heart failure seems to ignore the important fact that there is a right and a left side of the heart, and that we may have failure either of the right or left ventricle, not necessarily of both. In mitral disease the stress falls on the right ventricle, in Bright's disease or high tension in the peripheral circulation on the left ventricle. In the former we get right heart failure eventually, in the latter left heart failure if the patient survives other accidents. In each instance the ventricle, which has most work to do, hypertrophies to meet the extra strain, and digitalis when administered will naturally have its preponderating effect on the side which has the larger mass of muscle.

The inhibitory mechanism of the vagus on the heart has been described as analogous to reins in the hands of a skilled driver controlling a regularly trotting horse. If the horse is exhausted and nearly dead-beat no amount of pulling on the reins will help him on his way; what he needs is a powerful pick-me-up. In the pathological conditions of the heart to which I have alluded above, digitalis, if I may so interpret Professor Cushny's results, appears to act as a direct pick-me-up for the exhausted heart muscle rather than as a stimulus to the inhibitory mechanism of the vagus. This is what we might expect from Nature's common-sense methods.

There are many other questions of interest raised by Sir R. Douglas Powell, Dr. Colbeck, and Dr. Alexander Morison in their letters to THE LANCET of June 9th and 16th, amongst them the question of back pressure and the significance of cardiac murmurs. The disastrous effects of back pressure on the lungs in mitral stenosis are so self-evident, both from the pathological and clinical standpoints, that I do not think it is necessary to dwell on them. As regards the significance of murmurs, every clinician knows that the presence of a mitral systolic murmur in itself may be of little importance; what really matters is the degree in which the functional capacity of the heart is impaired, and this one can easily judge by the response of the heart to increased work on exertion and whether or no cardiac symptoms are readily induced thereby. But one cannot afford to ignore the grave effects in mitral stenosis or aortic lesions of any serious degree on the hydraulics of circulation and the mechanical embarrassment of the heart entailed thereby, apart from other considerations.

That work of the greatest importance has been done by Sir James Mackenzie by his polygraphic tracings and by Lewis with the electrocardiograph in elucidating the problems of heart-block, extra-systole, and sinus arrhythmia I should be the first to admit, but for the reasons given above I am unable to accept in its entirety the doctrine of auricular fibrillation.—I am, Sir, yours faithfully,

JOHN F. H. BROADBENT.

Seymour-street, W., June 18th, 1917.

THE USE OF POLYVALENT VACCINES IN DYSENTERY.

To the Editor of THE LANCET.

SIR,—As a result of the investigations of Dr. J. H. Harvey Pirie on the bacilli causing dysentery in African natives in the Carrier Corps depôt at Nairobi, it was decided to try the effect of a polyvalent vaccine as a therapeutic measure. From the literature available it appeared that the drawback to antidysenteric vaccines was their extremely toxic character. It was thought that possibly the heat used to sterilise the vaccines might be in some way a cause of this toxicity and it was decided to try to prepare a vaccine sterilised by antiseptics alone.

The first antiseptic tried was eusol, but, although the solution was freshly prepared, it was found that it failed to sterilise the cultures, even when added in large doses. Recourse was then had to 0·4 per cent. carbolic acid, the antiseptic employed in this laboratory in the preparation of autogenous vaccines. It was found that the addition of this strength of carbolic acid brought about complete sterilisation in about two days.

Dr. Pirie selected from his stock of local strains a Shiga bacillus and bacillus of the Morgan type. These were incubated in peptone broth for 48 hours at 37° C. The cultures were then carbolised and tested for sterility after 48 hours. The vaccine was administered to Africans

suffering from dysentery at the Carrier Depôt Hospital, Nairobi, and it was found to cause no toxic symptoms. The treatment was begun on Sept. 1st, 1916, and since then 350 cases have been treated or are under treatment at the time of writing. The results have been most promising, and at a later date it is proposed to publish complete statistics. The majority of cases respond immediately, and others which do not show much marked improvement are often complicated by bilharziasis.

The vaccine has since had a bacillus of the type Flexner added, with improved results. It now consists of six different strains in the following proportions: *B. Shiga*, 1 part; bacillus resembling *B. Shiga* in all its sugar reactions, but motile, 1 part; bacillus of the *B. Flexner* type, 1 part; three different strains of the *B. Morgan* type, 3 parts. The cultures are made in flasks of peptone broth and grown for three days at 37° C. They are then carbolised, tested for sterility after two days, mixed in the above proportions and issued as required.

Therapeutic inoculation was first attempted with a dose of 5,000,000 *B. Shiga* and 5,000,000 of mixed strains of *B. Morgan* type, increasing by 5,000,000 daily, but it was found that more satisfactory results were obtained with large doses at longer intervals. The usual dose at present is 1 c.c. of the vaccine, made in the manner and proportions described above, on the day of admission. On the eighth day 2 c.c. are injected subcutaneously; on the fifteenth day 3 c.c. and, if necessary, on the twenty-second day 4 c.c. Still larger doses are being tried at the time of writing, but it is too early yet to form an opinion as to whether these bigger doses are advisable or not.

In addition to the use of the vaccine as a therapeutic measure African porters passing through Nairobi Depôt are being submitted to prophylactic inoculation. Unfortunately, so far no figures are available to show whether this inoculation is of any value or not.

We are, Sir, yours faithfully,

PHILIP H. ROSS,
Director of Laboratories, British East Africa; Honorary Adviser to the Director of Medical Services, E.A.F.
W. H. KAUNTZE,
Captain, West African Medical Staff (attached East African Medical Service).

THE POPULATION OF ASYLUMS FOR THE INSANE.

To the Editor of THE LANCET.

SIR,—For some time past the *Daily Graphic* has been publishing articles vituperating public asylums and all connected with them. On June 13th this newspaper prints a long article entitled "Heroes in Asylums." Nearly one-half of this is taken up with the correspondence of a person who writes: "I have been detained by the Lunacy Commissioners ever since December, 1905, as a lunatic." Further on it states that a patient was visited by a *Daily Graphic* representative, who we must suppose is an expert, and who could find nothing the matter except "twitching of the nerves (*sic*) and a highly strung manner which is typical of nervous patients." This kind of nonsense has been read by many and if no reply is made the public naturally say that "silence is consent." Writing to the *Daily Graphic* has been tried, but the letter was not inserted. I am writing therefore to crave the indulgence of your columns and to state that the article in question contains numerous inaccuracies, to put it as mildly as possible. This information is not needed by your readers, but I am hoping that through the instrumentality of medical men the public may learn where the truth lies. In the *Times* on the same day a coroner is reported to have stated that it was a scandal that so many insane patients were discharged from asylums.

I am, Sir, yours faithfully,

R. H. STEEN.
City of London Mental Hospital, near Dartford, Kent, June 15th, 1917.

IRISH MEDICAL ASSOCIATION.—The annual general meeting of this association was held on June 14th, Dr. R. Marlay Blake presiding. Some discussion took place with reference to the Midwives Bill for Ireland which has been drafted by the Local Government Board, and the opinion was expressed that the Bill should be submitted to the medical profession before being introduced to Parliament.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue:—

Killed.

Capt. F. J. H. T. Frere, M.C., R.A.M.C., qualified at Durham in 1913 and held the appointment of house surgeon at Newcastle Royal Infirmary. He joined the R.A.M.C. on the outbreak of war and saw service in Gallipoli. The award of the Military Cross was announced in THE LANCET of Feb. 5th, 1916, p. 321.

Capt. O. Hairsine, M.C., R.A.M.C., was a student at Middlesex Hospital, and qualified in 1914, just prior to the outbreak of war, and thereupon joined the R.A.M.C. Capt. Hairsine was in the retreat from Mons, and the award of his Military Cross was recorded in THE LANCET of Jan. 22nd, 1916, p. 215.

Capt. L. E. Clark, Canadian A.M.C.

Capt. D. R. King, R.A.M.C., qualified at Glasgow in 1914 and shortly afterwards joined up.

Died of Wounds.

Lieut. W. A. Smith, R.A.M.C., attached Royal Field Artillery.

Wounded.

Capt. O. De Muth, R.A.M.C.
Lieut. A. G. H. Smart, R.A.M.C.
Capt. W. M. Cox, R.A.M.C.
Capt. A. C. Giles, R.A.M.C., attached S. Lanc. Regt.
Capt. J. McMillan, R.A.M.C., attached M.G.C.
Col. A. W. N. Bowen, R.A.M.C.
Capt. P. Hudson, R.A.M.C., attached Hamps. Regt.
Capt. W. B. Loveless, R.A.M.C., attached R. W. Regt.
Capt. H. C. D. Miller, R.A.M.C.
Capt. C. Witts, M.C., R.A.M.C., attached High. L.I.
Capt. K. J. Yeo, R.A.M.C., attached M.G.C.
Capt. J. J. Sinclair, R.A.M.C.
Capt. C. H. Carlton, R.A.M.C., attached London Regt.
Capt. A. J. McCreadie, R.A.M.C., attached Border Regt.
Capt. A. C. Court, R.A.M.C.
Capt. R. O. H. Jones, R.A.M.C.
Capt. J. Marshall, New Zealand M.C.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported:—

Second Lieutenant C. P. Lewis, Royal Engineers, killed in action, only son of Dr. P. Lewis, of Brixton-hill, London, S.W.

Second Lieutenant I. H. McCaw, Royal Irish Rifles, wounded, only son of Dr. J. McCaw, of Dublin-road, Belfast.

Second Lieutenant C. L. Green, Essex Regt., attached Royal Flying Corps, killed in action, elder son of Dr. E. F. S. Green, of South Norwood, London, S.E.

THE REMUNERATION OF THE MEDICAL STAFFS OF V.A.D. HOSPITALS.

It is now some time since Dr. Howard Marshall raised the question in a letter to the *Times* of the remuneration of the medical staffs of V.A.D. hospitals, but nothing has been done to place the position of these officers on a satisfactory basis. It has come out, mainly as the result of Dr. Marshall's action, that two years ago a form was issued, under the authority of a War Office letter, to the various commands, in accordance with which remuneration could be claimed by the medical officers of V.A.D. hospitals, but the existence of the form was not made known to the medical officers. Further, the remuneration, when given to certain of the officers, was construed as a private transaction. It may be that many medical officers of V.A.D. hospitals are prepared to give their services gratuitously and to defray their own out-of-pocket expenses, but to many others this must be a grave hardship. The whole question has for some time been under the consideration of the Central Medical War Committee, and it is essentially one where the War Office authorities should be ready to coöperate with that body and other representative bodies in putting matters on a sound financial footing.

OBITUARY OF THE WAR.

PERCY EAST LONES, M.R.C.S. ENG.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain P. E. Lones, who was killed in action on April 28th, at the age of 30, was the only surviving son of Dr. T. E. Lones, of H.M. Patent Office, and King's Langley, Herts. Educated at Watford, Dudley, and University College, London, he received his medical training at University College Hospital. Joining the University of London O.T.C. in August, 1914, he obtained the qualification of the Conjoint Board in the following January, and his commission in the R.A.M.C. a month later. In March, 1916, he left for India attached to the 1st Durham Light Infantry, and saw service in the Mohmand rising. Returning to England last February, he was sent to France, where he was killed instantaneously by a shell when in command of the bearers at a regimental aid-post.

Captain Lones was by nature courageous. Swimming was his chief sport, and in the summer of 1910 he saved a boy from drowning in the Thames. His senior officer writes of him as a reliable officer whose loss was keenly felt by the division. "Brave to a fault, always content, no matter what his lot. We all considered him a great acquisition to the ambulance." Captain Lones married Marian, daughter of Edward Wadsworth, of Harlesden, and leaves a widow and an infant daughter.

FREDERICK HUNTON, M.D., B.S. DURH.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain F. Hunton, who fell in action in Palestine on May 5th, was 48 years of age and a native of Stockton-on-Tees. He was educated at the Bishop Auckland Grammar School, taking his M.B., B.S. Durh., in 1891, from the College of Medicine in Newcastle-upon-Tyne, and his M.D. degree two years later. After acting as assistant to Dr. Blandford, of Norton, for four years, he became resident medical officer to the Stockton-on-Tees Union Hospital till 1898, when he purchased a practice at Sedgefield, co. Durham, becoming medical officer of health to the rural district, and continuing there till 1914, when he volunteered for active service in Egypt, and received a commission in the R.A.M.C., T., attached to the Northumberland Hussars, but was posted to the 53rd Welsh Casualty Clearing Station. After seeing the wounded come in from recent actions near Gaza, and on one occasion working amongst them for 84 hours at a stretch with only four hours' sleep, he was running to succour the men who were wounded during a bombing raid when he himself received a piece of the bomb, which pierced his chest and killed him instantaneously.

A medical friend writes of Captain Hunton:—"He was the ideal of a country practitioner, and by his cheery courage his professional skill, and his sterling character, he exercised a wide influence for good. He was one of those who loved the country. 'I know every tree on my rounds, and I shake hands with them as I pass,' he was wont to say, and being a great huntsman the winter in the South Durham country had its special charm for him. But before hunting he always did his round of patients, and duty was never better done, nor work more faithfully accomplished than by Hunton. Few men underwent more accidents: he broke his femur at football and had 1½ in. of shortening in one limb; he broke his collar-bone on a bicycle; he fractured his ribs on at least two occasions; and he had one kidney removed after a hunting accident. After joining the Army he had a comminuted fracture of the tibia, which was plated and recovered. I have never met a braver man, and in addition to overflowing physical courage he possessed moral courage in an equal degree. He asked only the question, 'Is it right?' and when satisfied he did not know fear." Captain Hunton was twice married and leaves a son and four daughters.

PERCY HERBERT BURTON, M.R.C.S. ENG.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain P. H. Burton, who was killed in action in France on May 13th, was the youngest son of the late Joseph D. Burton, of Cambridge Heath. He studied medicine at the London Hospital, where he became surgical clinical assistant qualifying in 1914. Shortly after the outbreak of war he offered his services to the War Office and was attached to the London Regiment, with which he served continuously, first in this country and latterly in France, from the beginning of 1915 to the date of his death. He had only returned to his battalion, after a short period of leave, four days before he fell. Of a consistently cheery and bright disposition, Captain Burton possessed an inherited and intuitive love for his work, which had an absorbing interest for him beyond that of professional duty. Letters from his superior officers testify to the value which these qualities conferred on his work as a military medical officer. Captain Burton leaves a widow but no children.

CHARLES RYLEY, M.R.C.S. ENG., D.P.H.,

MAJOR, ROYAL ARMY MEDICAL CORPS.

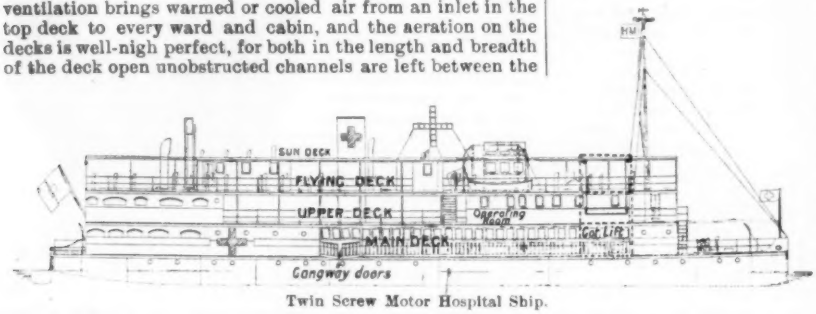
Major C. Ryley, who died on active service on May 4th, was only son of the late Charles Ryley, sometime of New Zealand. He took his medical course at St. Mary's Hospital, qualifying in 1901, and holding resident appointments there and at the Paddington Green Hospital for Children. In 1904 he joined the Royal Army Medical Corps, and after seeing service in China and Bermuda was sent to France in 1916 as Deputy Assistant Director of Medical Services. After an attack of pericarditis in July he never recovered his health completely, but insisted on remaining at his work, "always cheerful and amusing," according to the testimony of his colleagues. Finally he collapsed while on horseback and fell to the ground, being found dead when he was picked up. Major Ryley married in 1905 Christine, daughter of Major John Francis O'Brien, and leaves a widow and two sons.

MIDDLESEX HOSPITAL MOBILISATION CENTRE.

The officer personnel of the unit authorised by the War Office to be raised at the Middlesex Hospital Mobilisation Centre by Lieutenant-Colonel Sir James K. Fowler is complete. A supplementary list has been formed from which vacancies will be filled as they arise. This list remains open. Many offers which could not be accepted have been received from men beyond the limit of age for service abroad. Nurses and V.A.D.'s trained at the Middlesex Hospital are still required for service with this unit. The age-limit is 45 years. Applications should be addressed to the Lady Superintendent, Middlesex Hospital, W.

HOSPITAL SHIPS ON THE TIGRIS.

NEWS has recently been received by the British Red Cross of the safe arrival at Basra of the *Nabha*, one of a new fleet of hospital ships built to ply on the upper shallow reaches of the river Tigris. The hospital ship of which we give a profile view below is a similar vessel to the one recently inspected by the King before being sent out. With cot accommodation for some 200 patients, the ship draws less than 3 feet 6 inches of water, and can turn in twice its own length of 160 feet on account of an ingenious quadruple rudder. The main or lower deck, arranged as a hospital for serious cases, can be closed in for warmth—it can be cold as well as hot on the Tigris—while the windows turn on pivots in order to catch any available breeze in the hot weather. A plenum system of ventilation brings warmed or cooled air from an inlet in the top deck to every ward and cabin, and the aeration on the decks is well-nigh perfect, for both in the length and breadth of the deck open unobstructed channels are left between the



Twin Screw Motor Hospital Ship.

cots for the air to circulate freely, while an electric fan is provided for every cabin and for every group of four cots on deck. Gangway doors allow the direct embarkation of fracture cases on to either side of the several decks from which, when necessary, a cot-lift conveys them to the operating theatre on the upper deck. The arrangements have been designed by Lieutenant-Colonel R. M. Carter, I.M.S., to provide perfect comfort for the patients and facilities for their medical care and supervision within a minimum space, and in all this he has been eminently successful. The medical and surgical equipment is specially complete down to an abundant supply of the drugs likely to be required in a tropical country.

CEREBRO-SPINAL FEVER IN CONNEXION WITH THE WAR.

We have received the following report on cerebro-spinal fever in the county of Norfolk for 1915 from Dr. J. T. C. Nash, the county medical officer of health:—

Cerebro-spinal fever has shown a tendency to increase in England and Wales during the last three or four years. In the administrative county of Norfolk in 1915 there were 31 notifications—10 soldiers and 21 civilians. Of the 20 civilian cases of which I have notes, 11 were adult females, and 6 of the remaining 9 were children. Of the 3 males, one was a baker, another a postman, whose occupations might bring them into touch with soldiers. Of the first 10 cases of cerebro-spinal fever notified 6 were soldiers, 1 was the sister of a soldier, himself a victim, and 2 were females who came in contact with soldiers.

The first intimation I had of cerebro-spinal fever in Norfolk was from the military, who informed me, on Jan. 30th, that two cases occurred in troopers in the Aylsham district, who had been removed to the Norfolk and Norwich Hospital on Jan. 26th, and the diagnosis had been confirmed bacteriologically. One man had returned from Wales about a fortnight previously. On Jan. 30th there was also a notification of a case at Cromer—a servant girl who had mixed with soldiers, and of another case, a female, in the Aylsham district who also mixed with soldiers. The next case was a soldier in Freebridge Lynn district, notified on Feb. 6th. On Feb. 20th there was the notification of a farm-hand at Fritton, who was taken ill on Feb. 9th and developed symptoms of "brain fever" on Feb. 12th; he was removed to the Norfolk and Norwich Hospital, where he died 36 hours later. A post-mortem examination showed the presence of cerebro-spinal meningitis, but the meningococcus failed to grow from the cerebro-spinal fluid taken after death. No examination had been made during life.

The next case notified, on Feb. 21st, was a soldier who came home to Wymondham on leave from Felixstowe on Feb. 6th. He fell ill suddenly on the 8th and was first thought to be suffering from enteric fever. My attention was asked on Feb. 22nd. On Feb. 23rd he was removed with his sister (also now suffering from cerebro-spinal fever—confirmed by bacteriological examination of cerebro-spinal fluid) to hospital. On March 6th I had a notification of a *military* case at Hunstanton, and of another *military* case at Hilgay Fen, Downham. (This man had come from Felixstowe.) A further military case was notified from King's Lynn on March 13th, and yet another soldier from Thetford on March 22nd.

As I informed Dr. Farrar, of the Local Government Board, on this date, there had been up to this time 10 notifications of cerebro-spinal fever in the administrative county of Norfolk—4 in January (2 soldiers), 3 in February (2 soldiers and 1 civilian—a sister of one of the affected soldiers), and 2 in March (both soldiers). The other civilian case was the case diagnosed on post-mortem examination at the hospital. On March 27th a child, aged 4, was notified from a village in Walsingham rural district in which troops were billeted; and on the same date a military case was notified from Sheringham. On March 30th notified from Brundall, near Norwich, and a male civilian case (a postman) from Cromer.

On March 31st, 1915, I sent a circular letter to all the district medical officers of health pointing out that cases of cerebro-spinal fever were occurring mostly among troops, and stating that the military authorities had made arrangements with Dr. G. P. C. Claridge, of St. Giles Plain, Norwich, to make bacteriological examinations of suspected cases and contacts. As a result Dr. Claridge's services were arranged for in all districts where they were required or where there was any likelihood of cases of cerebro-spinal fever occurring.

On April 1st I received a military communication that a military servant who had been at Thurlton, near Loddon, had fallen ill with cerebro-spinal fever at Camberley. A suspected civilian case on April 4th was not confirmed by bacteriological examination. On April 6th a female child, aged 9, was notified at Loddon. The house had been visited by a soldier relative a few days previously. On April 8th a male civilian (baker) was notified in the Aylsham district. On April 12th I received a notification of a female (husband a soldier who had visited her eight days previously) in Erpingham district, near Cromer. On April 15th a female, aged 21, was notified from the Marshland district. She had been in contact with soldiers in King's Lynn. On April 17th a military case was notified from Diss; inquiries showed that he was merely *en passant* from Oakley to Cambridge. On April 26th a notification was received from London of an officer who had recently been at Loddon (Norfolk). Swabbing of military contacts in Norfolk showed a few "carriers" (13 !). The officer had left Norfolk ill on the 16th. (This case, the Camberley case, and the Loddon child notified on April 6th have apparently something in common.) On May 1st a civilian case was notified from Depwade. No further cases were reported during May. The particulars to this date show 10 military and 12 civilian cases (9 females, 3 males), all of the latter having more or less intimate relations with

soldiers. The sex incidence among civilian cases is noteworthy.

This completes the first chapter of the history of cerebro-spinal fever in Norfolk; the rest of the story can be summarised as follows:—

Chapter 2.—A period of six weeks having elapsed, a notification of cerebro-spinal meningitis in a female child, aged 2, was received on June 12th from the Freebridge Lynn district. Soldiers billeted about two miles away. On June 19th a notification was received of a male civilian case from West Lynn. The man had come from Hunstanton, where troops were stationed and where a military case was notified in March. These two cases were in north-west Norfolk.

Chapter 3.—A period of about two and a half months having elapsed, two children at Long Stratton were notified as suffering from cerebro-spinal fever on August 28th, and on the same date a military case was notified from King's Lynn.

Chapter 4.—No further cases for two months; then 3 cases in one house, notified on Oct. 30th, Nov. 6th, and Nov. 17th respectively—all females (one a baby). Contact of the first case with a soldier was clearly established; the others were house contacts.

Chapter 5.—The last notification of cerebro-spinal fever in the year was that of a male civilian, a solicitor living near and frequently in Norwich. Exact source of infection was not traced, but cases and carriers were occurring from time to time in Norwich. Thus, in the last half of the year 7 cases were notified, of which only 1 was a soldier. Of the six civilian cases 3 were young children, 2 were adult females, and 1 an adult male.

The history of the incidence of the disease during the year indicates a gradual transference from the military to the civilian section of the population, the first few cases being either soldiers or intimately connected with soldiers. Later no doubt a vicious circle was established—soldiers and civilians affecting each other.

The difficulty in dealing with outbreaks of cerebro-spinal fever lies chiefly in the fact that for every case there are generally found numerous "carriers" of the germ among the contacts. These have all to be subject to bacteriological examination, quarantine, and some form of treatment. It would not be difficult to overlook a carrier, and the manner in which the disease was held in check speaks volumes for the efficient aid given by Dr. Claridge.

THE HONOURS LIST.

The following awards to medical officers are announced:—

Distinguished Service Order.

Major Robert Thornton Meadows, R.A.M.C.

For gallant and meritorious service on the occasion of the mining of a hospital ship.

Capt. Ernest Stanley Stork, R.A.M.C., attached Yeomanry.

For conspicuous gallantry and devotion to duty. He displayed untiring energy and devotion to duty in evacuating a large number of wounded under heavy fire. He set a magnificent example of courage and determination.

Capt. (temp. Major) Alfred Charles Foster Turner, R.A.M.C.

For conspicuous gallantry and devotion to duty. He attended wounded under heavy fire day and night without rest. He was ever present along the line from the A.D.S. to the most advanced trenches, and on several occasions faced enemy artillery barrages in order that reserves of stretcher-bearers might reach their objectives.

Capt. William Ferguson Wood, R.A.M.C., Spec. Res., attached Hussars.

For conspicuous gallantry and devotion to duty. Under most trying circumstances and heavy fire he collected and tended the wounded without rest or food. He frequently made dangerous tours looking for wounded men.

Bar to the Military Cross.

Capt. James Alwin Colville Scott, M.C., R.A.M.C., attached Durham Light Infantry.

For conspicuous gallantry and devotion to duty. He behaved with great courage and coolness in attending the wounded under heavy shell fire. For two days he worked continuously, with an utter disregard for his own safety. By his efforts he was able to ensure the rapid evacuation of the wounded, and undoubtedly saved many lives. (The award of the Military Cross was announced in THE LANCET of Jan. 6th, 1917, p. 38.)

Military Cross.

Temp. Capt. Vincent Edgar Badcock, R.A.M.C., attached Highland Light Infantry.

For conspicuous gallantry and devotion to duty. He has behaved in a most gallant manner on several occasions in attending to wounded under intense shell fire, showing an utter disregard of personal danger, and setting a fine example to all.

Temp. Capt. James Harding Barry, R.A.M.C., attached London Regiment.

For conspicuous gallantry and devotion to duty. He showed the utmost coolness and bravery in going out under heavy machine-gun fire and assisting to bring in and attend wounded men. Throughout he set a splendid example to all.

Temp. Capt. Bertram Henry Barton, R.A.M.C.

For conspicuous gallantry and devotion to duty. He worked continuously under very heavy fire, and succeeded in bringing in many wounded men. His devotion to duty saved many lives.

Temp. Capt. Eric Biddle, R.A.M.C.

For conspicuous gallantry and devotion to duty. He showed great gallantry in supervising the removal of wounded from a heavily shelled area. By his untiring energy and disregard of personal danger he saved many lives.

Capt. Richard Thompson Cæsar, R.A.M.C.

For conspicuous gallantry and devotion to duty. On taking over the line, the cellars of the village were full of wounded. He proceeded with bearers to search all the cellars and organised removal of patients. Although the shelling was heavy and practically continuous, he remained all day and succeeded in clearing the village of all wounded.

Temp. Capt. John Donal Carroll, R.A.M.C., attached Royal Warwickshire Regiment.

For conspicuous gallantry and devotion to duty. An observation post had been hit, he immediately went to the spot and attended the wounded, although the enemy continued to concentrate heavy shell fire on the post.

Temp. Capt. James Alphonsus Conway, R.A.M.C., attached Oxford and Bucks Light Infantry.

For conspicuous gallantry and devotion to duty. He worked indefatigably under heavy fire, and by his personal attention saved the lives of a number of men. He set a fine example to all ranks.

Temp. Lieut. A. Yeshwant Dabholkar, I.M.S.

For conspicuous gallantry and devotion to duty. Although himself wounded, he displayed great courage and determination in tending wounded men under heavy fire. He set a splendid example to those around him.

Temp. Lieut. Erach Ruttonji Daboo, I.M.S.

For conspicuous gallantry and devotion to duty. He went forward at great personal risk and dressed many wounded men under very heavy fire. He was himself wounded.

(The award of the Military Cross to Temp. Lieut. Dabholkar and Temp. Lieut. Daboo has been announced in a previous issue of THE LANCET, and the deeds are now added.)

Temp. Capt. Oswald John Day, R.A.M.C.

For conspicuous gallantry and devotion to duty. He worked continuously under very heavy fire, and was responsible for the evacuation of a large number of wounded.

Capt. Walter Elliot Elliot, R.A.M.C., Spec. Res., attached Dragoons.

For conspicuous gallantry and devotion to duty. He worked continuously throughout the night tending the wounded under heavy fire. His devotion to duty saved many lives.

Capt. Henry William Evans, R.A.M.C., Spec. Res.

For conspicuous gallantry and devotion to duty. He showed the utmost bravery and zeal when commanding a stretcher-bearer division. He directed the bearers and tended the wounded in the open. By his exertions he secured the efficient clearing of the wounded over very long distances.

Capt. Alfred George Timbrell Fisher, R.A.M.C.

For conspicuous gallantry and devotion to duty. The advanced dressing station of which he was in command was destroyed by shell fire, and although himself severely shaken, he succeeded in forming a fresh dressing station.

Temp. Capt. Frederick George Flood, R.A.M.C., Spec. Res.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under very heavy fire. His disregard of personal danger inspired all ranks. He has previously done fine work.

Capt. Arthur Stuart Hebblethwaite, R.A.M.C., attached London Regiment.

For conspicuous gallantry and devotion to duty. He organised and trained a detachment of stretcher-bearers and supervised their operation under heavy fire. All casualties were cleared within a short time of the completion of the operations. This was due to the excellent training and example set by this officer.

Temp. Capt. Daniel Kennedy, R.A.M.C., attached Lancers.

For conspicuous gallantry and devotion to duty. He tended the wounded under very heavy machine-gun shell fire, to which he was continually exposed. It was owing to his bravery and untiring devotion that many lives were saved.

Temp. Capt. John Low, R.A.M.C.

For conspicuous gallantry and devotion to duty. He brought forward his bearer subdivision and established a dressing station under heavy fire, thereby relieving the regimental aid-posts. He worked continuously for 36 hours.

Capt. Gilbert Moore, R.A.M.C.

For conspicuous gallantry and devotion to duty. He was in command of the evacuation of the wounded for several weeks on an advanced front. He displayed skill in working his dispositions, and personally superintended the evacuation under heavy shell fire.

Capt. William Fraser Munro, R.A.M.C.

For conspicuous gallantry and devotion to duty. He worked continuously for 48 hours under very heavy fire, and was responsible for the evacuation of a large number of wounded. He set a splendid example to all ranks.

Capt. John Dover Proud, R.A.M.C., Spec. Res.

For conspicuous gallantry and devotion to duty. He worked continuously for 48 hours under heavy fire and succeeded in bringing in many wounded men.

Temp. Capt. Arthur Wilmot Raymond, R.A.M.C.

For conspicuous gallantry and devotion to duty. He organised and led a rescue party to dig out some men partially buried by the explosion of a shell in a captured enemy gun-pit. He set a splendid example of courage and determination.

Temp. Capt. Arthur Paul Saint, R.A.M.C., attached King's Royal Rifle Corps.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under heavy fire. His devotion to duty saved many lives.

Temp. Capt. Humphrey Meigh Stephenson, R.A.M.C., attached Rifle Brigade.

For conspicuous gallantry and devotion to duty. He tended the wounded under heavy fire, and showed a complete disregard for his personal safety. He set a magnificent example throughout.

Temp. Capt. James Williamson Tocher, R.A.M.C.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in attending to wounded for many hours during an intense hostile bombardment. He set a fine example to all ranks.

Temp. Capt. Frank Muir Walker, R.A.M.C., attached Royal Horse Artillery (Lieut. C.A.M.C.).

For conspicuous gallantry and devotion to duty. He has displayed the utmost gallantry and devotion to duty when under heavy fire. Particularly when he went through a heavy barrage to some wounded men, and tended them in the open for an hour.

Temp. Capt. Thomas Arnold Watson, R.A.M.C., attached King's Royal Rifle Corps.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under heavy fire. His devotion to duty saved many lives.

Capt. Charles Owen James Young, R.A.M.C., Spec. Res.

For conspicuous gallantry and devotion to duty. He went out under heavy shell fire and attended several wounded men in the open. He has on previous occasions shown fine disregard of personal danger in the face of heavy fire.

Capt. William Robert Aspinall, Australian A.M.C., attached Field Artillery.

For conspicuous gallantry and devotion to duty. He displayed the utmost courage and devotion in tending the wounded under heavy fire, and assisting them to places of safety until they could be evacuated. He showed the greatest gallantry throughout.

Capt. Ronald Lennox Henderson, Australian A.M.C., attached Infantry.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under very heavy fire. His devotion to duty saved many lives.

Capt. William Duncan Kirkland, Australian A.M.C., attached Field Artillery.

For conspicuous gallantry and devotion to duty. During hostile shelling two ammunition dumps were set on fire also causing several casualties. He immediately went to the assistance of the wounded, and, regardless of heavy shell fire and numerous explosions, dressed their wounds. He has at all times set a fine example.

Capt. Stanley Vincent O'Regan, Australian A.M.C., attached Infantry.

For conspicuous gallantry and devotion to duty. He worked continuously throughout the day tending to the wounded under very heavy fire. He set a fine example to all ranks.

Capt. Hugh Alexander Wyllie, Australian A.M.C., attached Infantry.

For conspicuous gallantry and devotion to duty. He tended the wounded continuously for two days under heavy fire. He set a splendid example of courage and determination.

GIFTS OF AMBULANCE WAGONS.—Motor ambulance wagons of various types which have been presented to the Scottish Branch of the Red Cross Society were on view in Glasgow lately, and were formally handed over in the transport headquarters there. The wagons consist of a field kitchen, a workshop, two vans for carrying supplies, two Red Cross wagons, and an ambulance with accommodation for four cot cases, the gifts of the Scottish Coal Owners and the National Union of Mine Workers in Scotland. A mobile X ray wagon, with complete equipment, was furnished by the Scottish Farmers' Union, and a dental wagon by an anonymous donor.

THE LANCET, VOL. I., 1917: THE INDEX.

THE Index and Title-page to the volume of THE LANCET completed with the issue of June 30th will be ready in July. Owing to the continued shortage in the paper-supply, the Index will not be issued with all copies of THE LANCET, as was the custom prior to the War. Subscribers who bind up their numbers are requested to send a post-card to the Manager, THE LANCET Office, 423, Strand, London, W.C. 2, when a copy of the Index and Title-page will be supplied free of charge.

THE SERVICES.

ARMY MEDICAL SERVICE.

Major (temp. Lieut.-Col.) H. A. Ballance, R.A.M.C., T.F., to be temporary Colonel.

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. O. W. A. Elsner, D.S.O., to be temporary Colonel whilst employed as Assistant Director of Medical Services of a Division.

Lieut.-Col. E. M. Morphew, D.S.O., to be temporary Colonel whilst Assistant Director of Medical Services of a Division.

Temp. Lieut.-Col. G. S. Buchanan, having resigned his appointment, reverts to the rank of temporary Honorary Lieutenant-Colonel.

To be acting Lieutenant-Colonels: Capt. W. E. C. Lunn whilst in command of a Field Ambulance and Major Thomas B. Unwin whilst in command of a Stationary Hospital.

Major Albert E. B. Wood relinquishes the acting rank of Lieutenant-Colonel on reposting.

Temp. Major A. M. Leake, V.C., to be acting Lieutenant-Colonel whilst in command of a Field Ambulance.

To be Temp. Majors: W. L. Braddon and Temp. Capt. H. S. Raper.

Temp. Lieut. P. J. O'Sullivan to be temporary Captain.

To be Temporary Captains: E. T. C. Milligan, H. D. Duke, R. Frell, G. R. Lawless, R. F. Yencken, A. Burton, C. R. Smith, J. Pugh, L. Bromley, C. W. B. Littlejohn, A. Fletcher.

To be temporary Lieutenants: J. Glaister, E. J. Stuckey, R. G. Struthers, J. Cullen, W. M. McDonald, R. E. V. Hale, G. Adam, J. A. Valentine, H. Daw, T. D. Webster, J. W. Trevan, J. C. Marshall, J. J. Keyms, P. J. Verrall, B. Hart, F. E. Higgins, J. B. Cooke, C. E. Lowe, S. C. Wilkinson, C. C. W. Pasco, F. Wilkinson, G. I. Cumberlege, J. H. Trench, J. L. Green, F. B. Penfold, A. M. A. James, D. S. Macbean, H. E. Jones, G. Hardwicke, H. A. De Morgan, E. L. M. Lobb, W. R. O'Keefe, H. W. Fisher, C. E. Waldron, D. M. Ross, A. T. W. Forrester, N. R. Ussher, S. P. Rowlands, C. C. W. Mays, A. Macdonald, G. S. Ewen, G. A. J. M. Loughnan, J. A. Wood, G. E. P. Davis, W. B. Blandy, F. W. W. Smith, P. O. Moffat, J. S. Higgs, S. Carter, H. W. Elwell, G. P. Young, A. H. McCandlish, G. W. Sudlow, C. H. Waddell, R. H. Robbins, S. McMurray, G. S. Robertson, R. K. Robertson, H. F. Warner, S. C. Shanks, C. Murray, W. S. George, G. Chalmers, R. Jamison, T. S. D. Enderby, F. L. Brewer, L. W. Roberts, W. B. H. Dundee, W. MacKenzie, L. Pern, H. G. Rashleigh, R. W. D. Hewson, J. G. Cooper, D. M. Boohan, W. Sanderson, F. Atthill, H. G. Drake-Brockman, T. J. George, J. F. Weston, F. Whincup, A. Emerson, H. A. Whitcombe, P. Hall-Smith, B. L. Galletly, W. A. Elwood, E. A. A. Saunders, A. I. Cooke, H. E. Heapy, J. C. Mann, F. W. Ritson, R. O. Smyth, L. B. Perry, F. Thompson, E. B. M. Price, J. A. MacKenzie, J. F. Douse, B. Wight, R. Gauld, G. M. Davies, J. A. Ross, R. C. Cummings, F. Talbot, J. E. Scott, S. Slade, A. J. Rae, A. Mason, J. H. Nichol, J. D. Bridger, J. P. McGowan, F. H. R. Heath, D. C. Dobell, T. R. Banister, C. I. Milne, A. H. John, J. Renwick, F. E. Wilson, H. A. Lyth, C. E. Pepper, A. G. H. Lovell, A. R. F. Hay, W. A. D. King, S. C. Ellison, A. F. R. Conder, A. Gilchrist, G. H. Shaw, J. Donaldson, A. L. Robinson, G. A. Johnstone, A. W. F. Edmonds, L. W. Shadwell, J. G. Macqueen, J. Brydon, A. J. McConnell, R. S. Frew, J. L. Hawkes, J. B. Macallan, C. H. Wilson, J. A. Durant, H. Brayshaw, R. G. Barlow, H. A. Williams, J. Jeffrey, M. W. Cantor, H. V. Swindale, H. N. Matthews, N. Morris, J. A. M. Clark, J. Dick, J. A. Currell, T. C. MacKenzie, J. A. Struthers, F. C. Morgan, W. P. Over, G. A. F. Heyworth, G. V. Anderson, A. Leeming, J. Menton, F. J. Child, C. A. A. Dighton, C. G. MacMahon, E. J. Fisher, R. H. Robinson, J. H. Moore, W. H. Bush, J. A. Jamieson, K. C. Edwards, A. C. Brown, R. H. Dixon, W. N. May, L. M. Markham, H. Christal, A. Gregory, W. M. T. Wilson, M. R. Dobson, L. S. Hooper, R. M. Erskine, R. Robertson, J. D. Clay, L. H. Burner, R. B. Radcliffe, J. Tait, J. C. L. Day, A. C. Sturrock, D. Gray, A. B. Rooke, H. L. Martyn, J. E. Sandilands, A. B. Robertson.

The undermentioned are granted temporary honorary rank whilst serving with the Irish Counties War Hospital: As Lieut.-Colonel: S. S. Pringle. As Major: W. G. Harvey. As Captain: H. de Lisle Crawford.

T. H. Brown, late temporary Lieutenant, to be honorary Lieutenant.

Officers relinquishing their commissions: Temp. Lieut.-Col. A. S. Woodwark (granted the rank of Lieutenant-Colonel). Temporary Captains: L. M. Breton (on account of ill-health), J. F. MacKenzie (on account of ill-health), A. Renshaw, E. V. Frederick, R. H. Drennan (on account of ill-health). Temporary Lieutenants: C. E. L. Burman, H. L. Craig, G. H. Clement, L. W. Kergin, J. S. Strachan (on account of ill-health).

SPECIAL RESERVE OF OFFICERS.

Lieuts. W. E. Wilson and J. B. Hume to be Captains.

To be Lieutenants: L. Jefferson (from Queen's University, Belfast Contingent, O.T.C.); W. H. White, D. J. H. Jones, and J. Braun (from University of London Contingent, O.T.C.); W. R. Mathewson (from Edinburgh University Contingent, O.T.C.); R. N. Burton.

Major H. G. Smeeth relinquishes the active rank of Lieutenant-Colonel on reposting.

TERRITORIAL FORCE.

Majors to be temporary Lieutenant-Colonels: D. J. Graham, F. D. Boyd, C.M.G., J. G. Andrew, R. A. Veale, J. H. Ray.

Major J. Ward to be acting Lieutenant-Colonel whilst commanding a Field Ambulance.

Captains to be temporary Majors: W. E. Alderson, L. G. J. Mackay, A. R. Bearn, H. B. Whitehouse, W. B. Secretan, R. Ollerenshaw, F. E. Tylecote, T. B. Mouat, J. H. Cobb, A. Young, A. A. S. Skirving, C.M.G., J. Eason, J. McC. Johnston, J. Henderson.

Capt. and temp. Major (acting Lieut.-Col.) T. H. Peyton, D.S.O., reverts to the temporary rank of Major on ceasing to command a Field Ambulance.

Capt. (temp. Major) A. H. Horsfall, D.S.O., relinquishes his temporary rank on alteration in posting.

Captains P. R. Wrigley and D. E. Core have been restored to the Establishment.

To be Lieutenants: L. Hawkes, W. V. Barritt.

Capt. G. R. Ellis relinquishes his commission on account of ill-health contracted on active service and is granted the honorary rank of Captain.

Surg.-Gen. W. R. Edwards, C.B., C.M.G., I.M.S., has been appointed an Honorary Physician to the King, vice the late Surg.-Gen. Sir B. Franklin, K.C.I.E.

THE DEVELOPMENT OF TRAINED NURSING IN FRANCE.

BY E. MONTIZAMBERT.

THERE is a fairly widespread idea that since the expulsion of the religious orders there have been in France no properly trained nurses for the sick. The number of women who have adopted the profession of nursing without proper equipment and the unsupervised direction of some of the private registry offices for sick nurses may give some foundation for this opinion.

It is not proposed to deal here with the schools organised by any of the three branches of the French Red Cross. The war has made these Red Cross organisations—especially the efficient school conducted by Mademoiselle Genin at the Hôpital École in the Square des Peupliers—very well known to the general public. There are, however, four or five admirable training schools organised in Paris in the last few years, and their steady and satisfactory growth will inevitably result in the disappearance of tolerated incompetency at an early date. The existence of excellent training schools for civilian hospitals or for private nursing remains almost unsuspected outside of France, and one constantly hears the unfounded statement, "What a pity there are no trained nurses in France!" One reproach most frequently made against the profession of trained nurses in France was that the members were drawn from an ill-educated class. That this was so was partly owing to the fact that nursing the sick was not considered a suitable occupation for well-bred women obliged to earn their living, and partly because of the unorganised and often unsatisfactory conditions under which private nursing was carried on.

Training School of Nurses for Daughters of Gentlemen.

These difficulties were smoothed away by Madame Achille Fould, who, at her own expense and after overcoming many difficulties, founded in 1905 a training school of nurses for the daughters of gentlemen. In one of the poorer quarters of Paris, a site was found where, in addition to buildings already occupied by the charitable activities of the sisters of Saint Vincent de Paul, a hospital for both sexes and excellent quarters for the pupils of the training school were constructed. Everything of hygiene and convenience has been carefully thought out. The details of the operating-rooms, the sterilising plants attached to every ward, and the radiography apparatus are all of the latest device, and every corner of the buildings, as well as every thing they contain, presents the polished cleanliness which marks a new era in French hospital work. An excellent dispensary, airy and spacious, with comfortable oaken benches for the patients and spotless dressing-rooms fitted up with the latest appliances is the scene of part of the hospital work, where the pupils take turns to be on duty. After a probation of three months at the school, the pupils are admitted as candidates for the "Diplôme Supérieur," given at the end of a two years' course of training. In the first year, they receive their theoretical instruction as well as a certain amount of practical work in their own hospital. At the end of this first year, still in their own school hospital, the pupils take courses in the "services" of surgery, ophthalmology, oto-rhino-laryngology, electrotherapy, massage, mechanotherapy, pharmacy. After that come supplementary courses in contagious diseases, maternity, and medical clinics in the different hospitals of the "Assistance Publique." After two months' study in each of the branches of hospital work, the students pass their final examination for the Diplôme Supérieur. The examination consists of a composition on a given theme, a written examination on the lecture notes, and oral questions covering the whole two years' course. The students are very carefully selected with a view to encouraging women of good breeding to take up the private nursing as a profession. Attractive quarters, comprising a bedroom, common sitting-room, and dining-room, are provided for them. During the first year of their training, a fee of £4 a month is supposed to be paid for board, lodging, heating, and laundry, but since the war this rule has been much relaxed. Care has been taken to regulate the conditions under which private nursing is undertaken by the pupils of "La Glacière," as this school is popularly called. A salary of not less than 10 francs a day or night, plus food, laundry and travelling expenses, is exacted, and in no case is the nurse allowed to take her meals with the servants. If there are empty rooms at the school ex-students like to return between their cases. Otherwise they may go to the "Foyer des Infirmières," a *pension* for trained nurses, opened last January at 98, Boulevard Auguste Blanqui. The "Hôpital École" de la Glacière in equipment, organisation, and method of training is worthy of comparison with any of the most up-to-date training schools either in England or America. While a Roman Catholic chapel exists in the grounds, a broad-minded liberality in religious matters gives absolute freedom to the followers of any form of faith. Every graduate does not take up private nursing, but the influence of the "crèche" and other charitable institutions grouped within the walls of what resembles a small village at 35 rue de la Glacière is sometimes seen when a graduate chooses district visiting, dispensary work, or regular hospital work among the poor as her vocation. But these are the exceptions: the majority of the graduates carry out Madame Fould's generous intention of founding, equipping, and defraying the running expenses of a school for professional trained nurses for private cases.

Maison École d'Infirmières Privées.

Another excellent school for trained nurses was organised at 66 rue Vercingétorix by Mademoiselle Chaptal and was recognised by the Government as an "établissement d'utilité publique" in 1911. Mademoiselle Chaptal has studied English institutions and her school is run more or less on English lines. The list of the "Comité de patronage médical" contains 31 of the names of the most brilliant members of the medical profession in France. As the society which directs the "Maison École d'Infirmières Privées" has to cope with different financial conditions from those of "La Glacière," the rules of this school are somewhat different. The regular pupils, at the end of their month's probation, sign a contract for five years with the society. This period includes two years' instruction, after which, on obtaining their diploma, they engage themselves to accept any work given to them by the committee. During these three years 10 per cent. of their salary, as well as a fixed sum of 1 franc a day while they are at work, has to be turned over to the society. The latter undertakes in exchange to obtain work for the graduates. While the principal aim of the school is to train women for private nursing, the graduates are permitted, even during their three years' contract, to accept work in hospitals or clinics. They are allowed to spend their holidays at the Maison École, where the *pension* is fixed at the modest price of 3 francs a day.

The instruction provided is fairly comprehensive. It consists of the probation month, when practical instruction in cooking, housekeeping, &c., and theoretical work in anatomy and physiology is done. Then follows a period of five months' hospital work, when 40 hours per week are spent in the medical wards in addition to the theory lectures given in the Maison École by the hospital staff. After that five months' work is done in the surgical wards, four months in the children's ward, two months of maternity work at the clinic Tarnier, one month at the Pasteur Hospital for Infectious Diseases, and four months in studying special branches such as nervous diseases at the Asile Sainte Anne, eye, ear, throat, and skin, &c. The remainder of the two years' course, which also comprises lectures given at the school in pharmacy, massage, and gymnastics, elementary and professional hygiene, invalid cookery, and a "cours de morale professionnelle," is accounted for by the one month vacation given each year. No examination is made at the end of this two years' course, the "certificat de fin d'études" is signed by the lecturers according to the evidence of the daily notes signed by the doctors under whom the students have worked. Great care is taken in the selection of the students, as Mademoiselle Chaptal's aim has been to raise the standard of trained nursing in France. On the payment of considerably higher fees, students who do not wish to contract a five years' engagement with the society are permitted to receive the same instruction.

Schools for Training District and other Nurses.

The Association pour le Développement de l'Assistance aux Malades, originally founded in 1900 by Madame Alphen-Salvador to encourage district nursing among the poor, at once organised an excellent training school where instruction in all branches of hospital work is given. A preliminary

examination to ensure a certain standard of education on the part of the students is required. There are written and oral examinations at the end of the first and second year, when the rank of "assistant" is obtained. A diploma is only given to those students who, after their two years' course, remain under the direction of the association for three more years. During this time they may be sent out either as private nurses or to fill some post in hospital or district nursing work. Until the war this École Professionnelle at No. 10, rue Amyot, suffered from the drawback of not having a hospital under its own direction, where the students might work under the eye of their instructors. The theoretical work was given at the school, but all the practical work had to be done in one or other of the different hospitals of the "Assistance Publique." This lack has been met last year in the opening of the new hospital school dedicated to the memory of Edith Cavell. The up-to-date hospital, built on a site belonging to the association in the rue Desnouettes, owes its existence to the coöperation of the military authorities, who were faced with the problem of the necessity for hurriedly training the number of amateur nurses whose devotion was not equalled by their knowledge. The military nurses who are sent to the Edith Cavell School are, however, quite apart from the regular students of the school. While they both gain their experience in the same hospital wards, the conditions under which they work are very different. The usual routine of hospital training, with its two years' course, is carried out by the professional students, who have their own class-rooms, &c., quite apart from the nurses who are taking a two months' supplementary course whose incompleteness is acknowledged as inevitable.

While this school is adding to the ranks of efficiently trained nurses every year, its main object still lies in supplying properly trained district nurses primarily for the 5th Arrondissement of Paris. In this work it shares the responsibilities of an organisation called the "Infirmières Visiteuses de France." The wonderful work it is doing for France deserves mention. Founded in February, 1914, and directed by Mdlle. Berthe Milliard, whose name is so well known for her efforts in connexion with the better education of women, this youthful society has already done such excellent work in systematically training nurses for district visiting that it may be regarded as the nucleus of a large body of women who will be able to cope intelligently with the many after-war problems among the poor and the inhabitants of the invaded districts of France. Already 200 fully trained nurses are at work both in Paris and the provinces. The usual course of two years' instruction has been necessarily shortened by the necessities of war-time conditions, but the same care is taken in the recruitment of the students who receive their training at the Laennec Hospital under Dr. Kuss. Special attention is paid to training for tuberculous patients, and the French Government have recognised the excellent work done by these nurses by appealing to them for nurses to staff the military hospitals for men attacked by this disease.

The Training School of the Assistance Publique.

No account of trained nursing in France would be complete without mentioning the splendid new school for training the nursing staff of that immense organisation for caring for the French poor known as the "Assistance Publique." This latest development of modern charity is fittingly installed in the oldest hospital in Paris, La Salpêtrière, which was founded in 1656 as a home for beggars. In the centre of a bewildering maze of buildings, some of which are still devoted to their original uses of asylums for the mentally afflicted, one finds a strikingly new building, opened in 1907, as a training school. Pupils come from all over France, and as the entrance examination is frankly made as simple as possible, the training is open to every class. The students receive free instruction, board, and lodging, and are paid 10 francs a month during their first year and 20 francs a month the following year. They sign a contract to serve for three years in the hospitals of the Assistance Publique at the end of their three years' course, otherwise their *pension* expenses of about £50 a year must be reimbursed.

Every department of the school is most thoroughly up to date, careful provision has been made for the comfort of the nurses, and the immense scale on which hospital work is carried on ensures the benefit of a wide experience for them.

The aim of this vast establishment is solely to supply the needs of its own organisations, but while many of the pupils are content to devote their lives to hospital work with the assurance of a State pension when the age-limit is reached, many of them ultimately take up private nursing after their five years' engagement is finished and are able to give to their patients the skill and knowledge they have gained under the direction of the most brilliant specialists in France.

Unhygienic conditions in certain hospitals may still exist, but a new era in nursing has begun, and the skill and science of the properly trained French nurse are second to none.

Medical News.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—An ordinary meeting of the Council was held on June 14th, Sir W. Watson Cheyne, the President, being in the chair.—A report was read from the Board of Examiners in Anatomy and Physiology for the Fellowship, stating that at the recent examination 30 candidates were examined, and that of these 12 passed and 18 failed.—A report was read from the Court of Examiners stating that at the recent Final Fellowship Examination 12 candidates presented themselves, of whom 3 were approved and 9 were rejected. The Diploma of Fellow was accordingly conferred upon the following gentlemen who have complied with the necessary by-laws:—

Alberto Medardo Zumora, M.B. Cantab., M.R.C.S., L.R.C.P., Guy's Hospital; Lyle John Cameron, M.D. Manitoba, M.R.C.S., L.R.C.P., Manitoba University, London and Charing Cross Hospitals; and John Dudgeon Oliver, M.B. Dub., M.R.C.S., L.R.C.P., Dublin, and Middlesex Hospital.

Diplomas of Member were conferred upon the following two candidates who have complied with the necessary by-laws:—

Edward Thomas Holdge, M.B. Toronto, Toronto University and Middlesex Hospital; Eleanor Joyce Partridge, Royal Free Hospital.

Licences in Dental Surgery were also conferred upon 16 candidates who have passed the requisite examinations and have complied with the by-laws of the College. The following are the names and schools of the successful candidates:—

Hubert John Vere Raywood Allin, Birmingham University; Theodore Boques Barton, Guy's; Albert William Ewart Chapple, Manchester University; Reginald George Joseph Charlesworth, Middlesex and Royal Dental; Leslie Douglas Crabb, Guy's; Morgan James Evans, Birmingham University; George Frederick Faustmann and Frederick George Pritchard Flanders, Guy's; Sidney Francis Greenfield, Middlesex and National Dental; Wallace Inman, Middlesex and Royal Dental; Harold John Powell, Guy's; William John Ross, Liverpool University; Willem Gerrit Ryss, Middlesex and Royal Dental; Robert William Spong, Guy's; Sidney Stamp, Middlesex and Royal Dental; and Sydney Granville Townley, Guy's.

The Secretary reported the death of Mr. W. B. Kebble, clerk in the secretary's office, who had been in the service of the College since 1884.

The Council elected the following examiners. Examiners in Anatomy and Physiology for the Fellowship:—Anatomy: R. W. Reid, Gordon Taylor, William Wright, and W. H. Clayton Greene. Physiology: G. A. Buckmaster, J. B. Leathes, H. W. Lyle, and F. A. Bainbridge. The Examining Board in England: Elementary Biology: W. G. Ridewood and G. P. Mudge. Anatomy: J. E. S. Frazer, Arthur Thomson, and F. Wood Jones. Physiology: C. M. Hinds Howell and G. A. Buckmaster. Midwifery: H. Russell Andrews, C. H. Roberts, J. S. Fairbairn, and G. F. Darwall Smith. Public Health, Part I.: J. W. H. Eyre; Part II.: F. N. K. Menzies. Tropical Medicine and Hygiene:—Bacteriology: J. W. H. Eyre. Diseases of Tropics: C. W. Daniels.

A letter was read from Mr. H. J. Waring reporting the proceedings of the General Medical Council at their recent session, when the thanks of the Council were given to Mr. Waring for his services as the representative of the College.—The President reported that he had nominated Mr. Bilton Pollard to serve on a tribunal which has been set up by the Ministry of Pensions for the consideration of appeals by discharged disabled sailors and soldiers with reference to the grant of gratuities in place of pensions.—The President reported that a meeting of Fellows would be held on July 5th next for the election of three Fellows into the Council in the vacancies occasioned by the retirement in rotation of Mr. W. Harrison Cripps and Mr. C. Warren Low, C.B., and by the death of Sir Frederic Eve, and that the list of candidates was as follows: Mr. Cripps, Mr. Low, Mr. H. B. Robinson, Mr. H. B. Grimsdale, Mr. F. J. Steward, Mr. James Sherren, and Mr. P. W. Bassett-Smith.—The President reported that the terms of office as examiners for the College of Mr. L. A. Dunn and Mr. W. H. Dolamore would expire on July 25th, and that the vacancies would be filled at the ordinary meeting of the Council on July 26th.

ROYAL MEDICAL BENEVOLENT FUND.—The following are the details of cases of special distress caused by the war which the committee have helped from the War Emergency Fund:—

Lieutenant in the R.A.M.C. who had only been in practice a few years, volunteered for service and was killed in action a few days later. He left a widow with two children, aged 3½ years and 1 year, without means except the War Office pension. The Fund voted £25 for immediate necessities, and the Officers' Families Fund gave further help.—Captain in the Territorials was called out and had to leave his practice in the hands of a locum, who proved a failure. There were seven children, aged 2–14. Financial difficulties arose, and payment of the school fees became impossible. Between the Fund and Guild and the Officers' Families Fund the necessary fees were raised and sorely needed clothing provided.—Captain in the Territorials who was called out when the Army mobilised and had to leave his practice, worth £300, at a day's notice. Could not pay the fees for his son's education, who was in his last year at school. The Fund, the Guild, and the Professional Classes War Relief Council together raised the necessary money.—Captain in the Territorials was killed in action and left a widow and two children, aged 3 and 4½ years. The Fund investigated the case and referred it to the Officers' Families Fund, who granted a sum of money to meet immediate necessities. The Fund also obtained work for the widow, a trained nurse, who was thus enabled to earn her own living.—Major R.A.M.C., Territorial, was called out at the beginning of the war, and was abroad for over two years. He was invalided to England and put on home service. His practice was completely lost by his absence. There are three children, one in the Navy, one in the Army, and one at school. He had to give up his house, as he was in difficulties with rent, taxes, and education. The Fund gave £50, and further help was obtained from other sources.—Captain in the R.A.M.C. (T.), with a wife and six children; found the income derived from his practice, left in the charge of a locum, and the balance of his Army pay insufficient to meet his minimum expenses. He obtained assistance from the Civil Liabilities Committee and the Officers' Families Fund, and a grant was made from the War Emergency Fund towards the education of the children.—Practitioner, earning £700 to £800, volunteered for service, leaving his practice in the hands of a neighbour, who was not a success. There were two children, aged 7 and 10, and another baby was born shortly after the husband left. The wife contracted pneumonia and nearly died. A resident patient had to leave the house. Rent and other expenses led to a debt of about £80. This the doctor could not meet, and he hurried back from the trenches to save his home from being sold up. The Fund voted £25, the Guild gave £15, the Officers' Families Fund £25, and the Professional Classes War Relief Council offered further help, with the result that he returned to the Front with his immediate anxieties relieved.

Subscriptions may be sent to the acting honorary treasurer, Dr. Samuel West, at 11, Chandos-street, Cavendish-square, London, W. 1.

THE address of the National Council for Combating Venereal Diseases is now Avenue Chambers, Southampton-row, London, W.C. 1.

CONFERENCES ON VENEREAL DISEASES.—The second annual meeting of the National Council for Combating Venereal Diseases was held at the Queen's Hall, London, on June 13th, Lord Sydenham presiding. The latest information was given by Lord Rhondda regarding the council schemes for diagnosis and treatment. Out of a possible 145, schemes had been submitted by 102 councils (representing a population of 26 out of the total 36 millions), and of these 68 had been approved. In 52 hospitals, dealing with a population of 16 millions, work had already commenced in the treatment centres. Up to the end of May 6000 new cases were treated in the London clinics alone, and the centre at the Albert Dock Hospital was doing specially useful work in arresting cases of venereal diseases imported from abroad.—A conference took place at the beginning of the month under the auspices of the Public Health Committee of Edinburgh Town Council. Sir Malcolm Morris, chairman of the Propaganda Committee of the National Council, dealt in an exhaustive way with the legislation which enabled communities to deal with the diseases. The Edinburgh corporation are preparing a scheme in accordance.

SOCIETY FOR THE STUDY OF INEBRIETY.—The next meeting of this society will be held in the rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square, W., on Tuesday, July 10th, at 4 P.M., when Dr. Stanley Kent, professor of physiology in the University of Bristol, will open a discussion on "Fatigue and Alcohol."

ROYAL VICTORIA HOSPITAL, BELFAST.—A committee of business men who have investigated the finances of the Royal Victoria Hospital, Belfast, have published a table contrasting the hospital with similar institutions in the United Kingdom, and from their figures it appears that in 1916 the cost per bed in the Royal Victoria Hospital was £80, which was only surpassed in smallness of amount by the Aberdeen Hospital (where it was £70), by the Hospital in Dundee (where it was £71), and by the Royal Infirmary, Edinburgh (where it was £76). The highest cost per bed was at the London Hospital, where for 1916 it was £143. In Birmingham it was £107, in Leicester £103, and in Cardiff £102. In the Royal Victoria Hospital the average beds occupied in 1916 were 277·6, instead of 266·8 in 1915, and the expenditure was £10 per bed higher.

RED CROSS GIFTS.—£100,000, the first instalment of the amount raised in Victoria in response to the appeal made by Lady Stanley, wife of the Governor, are being remitted to London for the British Red Cross.

Sir E. Cooper Perry has been elected Vice-Chancellor of the University of London for the ensuing year, as successor to Sir Alfred Pearce Gould.

ROYAL MEDICAL BENEVOLENT FUND OF IRELAND.—The annual meeting of the Royal Medical Benevolent Fund was held on June 14th at the Royal College of Physicians, Dr. J. F. O'Carroll, President of the College, presiding. The annual report stated that the number of applicants during the year had been large, and the amount recommended to be given in grants was greater than usual. The total amount of grants was £1239. The branch subscriptions showed a substantial improvement. Donations and bequests fell short by only £24. The income was £1629, showing a gratifying increase of £362.

SOUTH LONDON HOSPITAL FOR WOMEN.—The fifth annual report of this hospital, dealing with the year 1916, refers to the new buildings for in-patients opened in July last by the Queen, who has become patron of the hospital. In the October following two wards were available for patients, and by December 66 in-patients had been provided for. It is hoped that the remaining 14 beds will be ready as soon as the necessary nursing staff can be obtained. At a meeting recently held on behalf of the hospital Sir Alfred Keogh, Director-General of the Army Medical Service, said that the Local Government Board had recognised it as a treatment centre for venereal diseases, and he looked to the hospital to render great public service in the venereal campaign. Lady Londonderry said the accommodation of the hospital was far less than was needed both in the matter of beds and the treatment of out-patients. An increased nursing staff was a pressing need.

DONATIONS AND BEQUESTS.—By the will of the late Lieutenant-Colonel Sir John Howard, of Brighton, the testator has left £40,000 in trust to establish a "John Howard" Hospital, primarily for surgical cases, and for the use of patients able and willing to pay reasonable and ordinary fees, or to assist any existing hospital, or for other hospital purposes in Brighton; £33,000 and the land on which it is built for the "John Howard" Convalescent Home and for the erection of 24 cottages for the use and lodging of trained hospital nurses whose health has broken down, and for the payment of 10s. a week to each of the inmates; and £600 a year for 21 years for the "Howard Charity" for the relief of distressed widows and aged and sick poor of Brighton; £300 to the Sussex County Hospital; and £200 to St. Bernard's Home for Invalid Gentlewomen.—The late Mr. Arthur Edward Seawell, of Farnham, has left by will £300 to the Alton Cottage Hospital and £200 to the London Hospital.—Under the will of the late Mr. Henry William Ransom, of Folkestone, the Victoria Hospital, Folkestone, will receive £1000.

URBAN VITAL STATISTICS.

(Week ended June 16th, 1917.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 17,000,000 persons, the annual rate of mortality was 12·8, against 12·7 per 1000 in each of the two preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was 12·3, or 0·2 per 1000 above that recorded in the previous week; among the remaining towns the rates ranged from 3·7 in Grimsby, 4·7 in Wimbledon, and 5·2 in Swindon, to 20·9 in Hastings, 21·2 in Middlesbrough, and 26·2 in South Shields. The principal epidemic diseases caused 317 deaths, which corresponded to an annual rate of 1·0 per 1000, and included 195 from measles, 46 from infantile diarrhœa, 35 from whooping-cough, 28 from diphtheria, 10 from enteric fever, and 3 from scarlet fever. The deaths from measles were 13 below the number in the previous week, and caused the highest annual death-rates of 2·9 in Sunderland, 3·1 in West Bromwich, 4·1 in Walsall and in Rotherham, and 5·9 in Middlesbrough. The 601 cases of scarlet fever and 1089 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were respectively 35 below and 7 above the numbers remaining at the end of the previous week. Of the 4160 deaths from all causes in the 96 towns, 141 resulted from violence. The causes of 32 deaths were uncertified, of which 5 were registered in Birmingham and 5 in Liverpool.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual death-rate was equal to 14·7, against rates declining from 17·0 to 14·9 per 1000 in the four preceding weeks. The 335 deaths in Glasgow corresponded to an annual rate of 15·7 per 1000, and included 31 from measles, 29 from whooping-cough, and 1 each from diphtheria and infantile diarrhœa. The 85 deaths in Edinburgh were equal to an annual rate of 13·4 per 1000, and included 10 from measles, 6 from whooping cough, and 1 from scarlet fever.

Irish Towns.—The 136 deaths in Dublin corresponded to a rate of 17·8 per 1000, and included 3 from measles and 2 from infantile diarrhœa. The 117 deaths in Belfast were equal to a rate of 15·5 per 1000, and included 3 from infantile diarrhœa and 1 each from enteric fever, measles, and diphtheria.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

Report of Mesopotamia Commission.

THE report of the Commission of Inquiry into Military Operations in Mesopotamia has been laid on the table of the House of Commons.

Chemistry at Edinburgh University.

An ordinance of the Edinburgh University Court respecting the foundation of a chair of Chemistry in relation to medicine has been presented to Parliament.

HOUSE OF COMMONS.

WEDNESDAY, JUNE 13TH.

Treatment of Shell Shock.

Colonel YATE asked the Under Secretary for War whether permission could now be given for soldiers suffering from shell shock and other convalescents in hospitals and command depôts who were fit for light work to employ their leisure time, when they wished to do so, in agriculture, gardening, and the cultivation of any land there might be in the neighbourhood, so as to afford the men some relief from the monotony of their existence and give them an interest in life.—Mr. MACPHERSON replied: Soldiers in command depôts are already employed in the cultivation of land in and about the depôts. Arrangements have been made and are being extended by which men in hospital suffering from shell shock are employed on agricultural work as soon as they are fit for it. As regards other convalescents, the first concern of the Army authorities is to get men fit again as quickly as possible to resume military duty.

THURSDAY, JUNE 14TH.

Repatriation of Incapacitated Prisoners.

Mr. J. F. HOPE (representing the War Prisoners Department) informed Mr. MACMASTER that the Government had heard from the French Government that an extended agreement for the repatriation of French and German incapacitated combatant prisoners had been in force for a week, but he did not yet know the details. The only agreement in force between H.M. Government and the German Government for the repatriation of combatant prisoners of war was in respect of those who were totally incapacitated from further military service. It should be understood that this reply applied only to exchange of prisoners and not to internment in neutral countries.

Pensions for Officers and Nurses.

Replying to Sir H. CRAIK, Mr. BARNES (Pensions Minister) regretted that the new Warrant in regard to the pensions of officers and nurses had been delayed, but he thought that a satisfactory settlement was now in sight, and he hoped to lay the document before the House within the next fortnight. The beneficiaries would suffer no disadvantage, as payment under the new scales would operate as from April 1st.

Medical Re-examinations.

Answering Sir M. LEVY, Mr. MACPHERSON (Under Secretary for War) wrote: I am aware that attempts are being made to stir up dissatisfaction with the administration of the Military Service (Review of Exceptions) Act. There have been cases in which reasonable grounds for dissatisfaction have been present. In practically every case these grounds have been removed before any public comment arose. The whole administration is being, and will continue to be, most carefully watched, and throughout the country Medical Boards are working with great care. I am not aware that any man totally unfit for military service is being accepted for active service. If my honourable friend will supply me with details of the cases he has in mind they will be fully inquired into. Copies of all printed instructions issued in connexion with the Review of Exceptions Act are in the library of the House of Commons. No secret or oral instructions have been issued by the Army Council. With reference to alleged cases of disagreement between the classification shown on a man's medical history sheet and on his classification card, I have no knowledge. The proceeding is to attach to the medical history sheet a counterfoil of the classification card. This counterfoil is made out at the same time as the classification card received by the man. It, therefore, is unlikely that mistakes are made. If the honourable Member knows of any specific instance full inquiries will be made. The instructions dealing with this matter are in the library of the House. Figures as to the percentage of men rejected as totally unfit who on re-examination have been classified in categories A, B, and C are not yet available for the whole country, but in some localities the percentage of A category men has been low. In one district notorious for fraudulent rejection in the past the percentage has been as high as 25 on the examinations conducted up to June 1st. All the suspected cases were called first in that area, and the result has been fully to substantiate the worst fears of the authorities. The boards conducting those examinations were composed entirely of civilian medical men with Territorial or temporarily commissioned or retired presidents. They have been specially inspected by inspectors from the War Office and their work has been reported as a model of careful examination.

R.A.M.C. Officers Training Centre.

Mr. MORRELL asked the Under Secretary for War whether he was aware that a large number of qualified surgeons and medical practitioners were undergoing a course of military training at Blackpool; whether many of these men had for weeks past been engaged all day on the usual infantry drill without the opportunity of doing any medical or surgical work of any kind whatever, although in many cases they were highly skilled men and had given up large practices in order to serve in the Army; whether a similar state of things existed in other training centres; and whether, in view of the need for doctors and surgeons at the front, he would take any steps in the matter.—Mr. MACPHERSON answered: Medical men are sent to Blackpool training centre for a short course of instruction, on the completion of which they are despatched to the forces abroad. All the officers other than the permanent staff of those temporarily unfit for service abroad are waiting opportunities for shipment. There is no other training centre for Royal Army Medical Corps officers.

Promotions of R.A.M.C. Officers.

Captain WRIGHT asked the Under Secretary for War whether Territorial officers of the Royal Army Medical Corps had recently been sent out to France in charge of branch Territorial hospitals with the rank of temporary major who were not Territorial officers before the war, or were not on the staff of a recognised Territorial hospital, and therefore not *à-la-suite* officers, whilst officers who were serving before the war, who had been mobilised since August, 1914, at the front since February, 1915, and in some cases officers commanding surgical division at general hospitals were held not to be eligible for promotion above the rank of captain; and why doctors who until recently had remained in the enjoyment of their practices in England were given advantages of promotion and pay over officers who had been voluntarily serving in His Majesty's Forces for years before, and continuously since, the beginning of the war.—Mr. MACPHERSON answered: I am not clear to which hospitals my honourable and gallant friend refers. If he has in mind the special Territorial general hospitals which were recently sent overseas, the senior officers were specially selected from the Territorial Force general hospitals in each command which furnished a hospital. These officers by a special arrangement were to serve for a minimum period of three months, and be relieved when necessary by other officers on the staff of the parent hospital. Appropriate acting rank was given to officers occupying positions where such promotion was considered desirable. The question of appointing field officers to the charge of the medical and surgical division of all general hospitals is under consideration.

Mr. MACVEAGH asked the honourable gentleman what principles, or basis of principles, now obtained for the selection of officers in the Royal Army Medical Corps for promotion in rank; whether the same principles for purposes of promotion held in the case of Royal Army Medical Corps officers in the Regular Force, the Territorial Force, and the temporary commissioned officers; whether any differences in the system of promotion existed in the different branches of the Royal Army Medical Corps; whether his attention had been called to certain recent promotions in the Territorial Force to the rank of major in the Royal Army Medical Corps; whether all or most of the officers so promoted had till quite recently been serving at home; whether he was aware that such promotion over the heads of other officers, some senior in previous and present service, in the same and other branches of the Royal Army Medical Corps who had had considerable overseas service was prejudicial to the interests of the medical service and was likely to increase the sense of injustice as to the irregularity of promotions, and that injustice had been done in some instances; and whether such promotions came within the purview of the recently appointed Army Promotions Board.—Mr. MACPHERSON wrote in reply: Promotions in the Royal Army Medical Corps, Regular, Special Service, and Territorial Force, up to the rank of major are governed by a qualifying time period of service for each step in rank. Promotions above the rank of major are by seniority and selection. In the case of a temporary commissioned officer promotion to captain is given after 12 months' service and promotions to higher rank are given in individual cases as suitable vacancies arise according to the officer's qualifications and

the nature of the appointment for which such promotion is considered necessary. No differences other than those enumerated exist in the system of promotion in the different branches of the Royal Army Medical Corps. If my honourable friend is referring in the latter part of the question to promotions made in the Special Territorial Force general hospitals, which were recently sent to France under special conditions to meet emergency, the promotions made in these units are all temporary and are not considered as prejudicial to the interests of the medical service or as causing injustice to other officers. The whole question of promotion generally in the Royal Army Medical Corps Territorial Force comes within the purview of the committee presided over by the Member for Dundee (Mr. Churchill).

Sir E. GOULDING asked when the report of the committee which had considered and reported on the question of promotion in regard to the General Reserve of Officers, the Special Reserve of Officers, and of the Territorial Force would be laid upon the table.—Mr. MACPHERSON replied: The recommendations of this committee are being sympathetically considered, and as soon as final decisions have been reached in regard to them the report will be presented to both Houses together with a note of the decisions. I trust this will be done very shortly.

Medical Students and Military Service.

Mr. DILLON asked the Under Secretary for War whether, in view of the increasing demands by the War Office on the medical profession and the great number of casualties amongst doctors in the field, the War Office would exempt all medical students of one year's standing and upwards from liability to be called up under the Military Service Acts.—Mr. MACPHERSON wrote in reply: The Army Council has been in close touch with the medical authorities, and the need for providing for future needs of the medical profession has been given full weight. Under present arrangements a large measure of protection is given to medical students. None of those who are within 24 months of qualification are called up for service, while of those in the earlier years only men fit for general service or classified B 1 are called up. In view of the present need of men of those categories for combatant service it is not considered that in the national interest any alteration of the present arrangement should be made.

MONDAY, JUNE 18TH.

The Case of Dr. J. C. M'Callum.

Mr. T. E. HARVEY asked the Home Secretary whether Dr. J. C. M'Callum, a graduate of Edinburgh University, medallist and holder of the Mouat scholarship, executive tuberculosis officer for the county of Argyll, holding the diploma of public health, and having specialised in the treatment of tuberculosis, had been employed by the Home Office Committee on Employment of Conscientious Objectors, first at Wakefield and then as a labourer in the manufacture of manure for Messrs. Rough and Sons, Broxburn, Edinburgh; whether, in consequence of a breach of workshop discipline, this employment had been terminated; and whether, in the national interest, he would consider the possibility of employing this specialist on public health work under whatever financial conditions the committee's regulations imposed instead of on work for which he was not fitted or instead of sending him back to court-martial and prison.—Sir G. CAVE replied: John M'Callum has been employed as stated. His employment has been terminated, not for one but for several breaches of discipline. The Committee on the Employment of Conscientious Objectors have recommended his recall to the Army, and the case is now out of their hands. I understand that Dr. M'Callum has never applied to the Committee to be released in order to take up employment as a doctor, but he and members of his family have made applications for him to be allowed to do ploughing and similar work for relatives.

Mr. HARVEY: Will the right honourable gentleman consider that this Committee should employ doctors for medical work in view of the great need for doctors in this country?—Sir G. CAVE: If applications were made for their services no doubt they would be considered.

American Medical Men.

Replying to Sir G. GREENWOOD, Mr. MACPHERSON (Under Secretary for War) said: We only propose to accept the services of American doctors sent to us by responsible authorities in the United States.

Surgical Aid in Air Raids.

Mr. BROOKES asked the Home Secretary whether, on the occasion of the recent air raid, one of the leading hospitals had to request the services of an entire Army Medical Board; and whether arrangements existed for ensuring prompt and adequate surgical aid in all cases.—Sir G. CAVE wrote in reply: Arrangements are made by the police for securing the services of doctors and ambulances and making other provisions for rendering first aid. I understand that on Wednesday last, owing to the short time which elapsed between the receipt of warning by the police and the occurrence of the raid, medical aid was urgently required, and the services of the members of an Army Medical Board were requisitioned.

TUESDAY, JUNE 19TH.

A Ministry of Health.

Sir W. COLLINS asked the Chancellor of the Exchequer whether any decision had been arrived at by the Government as to the establishment of a Ministry of Health.—Mr. BONAR LAW replied: I am not yet in a position to make any statement.

Sir W. COLLINS: Are we to understand that the statement published yesterday on the authority of the President of the Local Government Board to the effect that a Ministry of Health is about to be established is incorrect?—Mr. BONAR LAW: I have not noticed that. I know that my noble friend has been working on the subject, but the Government has come to no decision, and it is not possible to introduce legislation this session.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

BOYCE, C. R., F.R.C.S. Irel., has been appointed Certifying Surgeon under the Factory and Workshop Acts for the Enniscorthy District of the County of Wexford.

LUCAS, C. B., L.R.C.P. & S. Edin., L.F.P.S.G., Certifying Surgeon under the Factory and Workshop Acts for the Foyers District of the County of Inverness.

WOOD-SMITH, ALGERNON, M.D., F.R.F.P.S.G., School Medical Inspector to the County of Stirling.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).

When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

BELGRAVE HOSPITAL FOR CHILDREN, Clapham-road, S.W.—Resident Medical Officer for six months. Salary at rate of £75 per annum, with board, &c.

BIRMINGHAM.—Female Locum Tenens for Infant Consultation Work for three months. Salary 8 guineas per week.

BODMIN, CORNWALL COUNTY ASYLUM.—Female Junior Assistant Medical Officer. Salary £200 per annum, with board, &c.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon. Salary at rate of £120 per annum, with board, &c.

CARDIFF, KING EDWARD VII.'S HOSPITAL.—House Surgeon for six months. Salary at rate of £200 per annum, with board, &c.

CHELSEA HOSPITAL FOR WOMEN, Arthur-street, Chelsea, S.W.—Resident House Surgeon and Registrar for 12 months. Salary £150 per annum.

DEVONPORT, ROYAL ALBERT HOSPITAL.—House Surgeon, unmarried. Salary £150 per annum, with board, &c.

DONNYBROOK, DUBLIN, ROYAL HOSPITAL FOR INCURABLES.—Resident Medical Officer, unmarried. Salary £200 per annum, with board, &c.

EAST LONDON HOSPITAL FOR CHILDREN, Shadwell, E.—Assistant Resident Medical Officer. Salary £125 per annum, with board, &c.

ENFIELD, ROYAL SMALL ARMS FACTORY.—Assistant Medical Officer. Salary £438 per annum.

EVELINA HOSPITAL FOR CHILDREN, Southwark, S.E.—House Physician. Salary at rate of £160 per annum, with board, &c. Also Clinical Assistants in Out-patient Departments.

GENERAL LYING-IN HOSPITAL, York-road, S.E.—Resident Medical Officer for three months. Salary £100 per annum, with board.

GLOUCESTERSHIRE ROYAL INFIRMARY AND EYE INSTITUTION.—Assistant House Surgeon. Salary £150 per annum, with board, &c.

GUILDFORD, ROYAL SURREY COUNTY HOSPITAL.—House Surgeon. Salary £250 per annum, with board, &c.

HAMPSTEAD GENERAL HOSPITAL, Haverstock Hill.—Resident House Physician for six months. Salary at rate of £200 per annum.

LEEDS GENERAL INFIRMARY.—Resident Aural Officer. Salary £100 per annum, with board, &c.

LEICESTERSHIRE EDUCATION COMMITTEE.—Temporary Assistant School Medical Officers. Salary at rate of £350 per annum.

MANCHESTER AND SALFORD LOCK HOSPITAL.—Temporary Part-time Medical Officer. Salary £300 per annum.

MANCHESTER CHILDREN'S HOSPITAL, Pendlebury, near Manchester.—Two Female Resident Medical Officers, unmarried. Salary at rate of £200 per annum.

MANCHESTER COUNTY ASYLUM, Prestwich.—Locum Tenens. Salary £7 7s. per week, with board, &c.

NOTTINGHAM GENERAL HOSPITAL.—Holiday Locum Tenens, Female. Salary at rate of £250 per annum, with board, &c.

OLDHAM ROYAL INFIRMARY.—Third House Surgeon. Salary £225 per annum, with board, &c.

PLYMOUTH, SOUTH DEVON AND EAST CORNWALL HOSPITAL.—House Physician. Salary £200 per annum, with board, &c.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, Marylebone-road, N.W.—Assistant Resident Medical Officer for four months. Salary at rate of £60 per annum, with board, &c. Also District Resident Medical Officer for four months. Salary at rate of £60 per annum, with board, &c.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—House Physician for six months. Salary £100 per annum, with board, &c.

ROTHERHAM HOSPITAL.—Junior House Surgeon. Salary £150 per annum, with board, &c.
ROYAL LONDON OPHTHALMIC HOSPITAL, City-road, E.C.—Third [illegible] House Surgeon. Salary at rate of £50 per annum, with board, &c.
SALFORD ROYAL HOSPITAL.—Junior House Surgeon. Salary at rate of £150 per annum, with board, &c.
SHEFFIELD ROYAL INFIRMARY.—House Physician. Salary £120 per annum, with board, &c.
SHEFFIELD UNION HOSPITAL, Firvale.—Female Resident Assistant Medical Officer. Salary £250 per annum, with rations, &c.
SHREWSBURY, ROYAL SALOP INFIRMARY.—House Physician. Salary at rate of £200 per annum, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Raunds, Northampton; Rosscarbery, Cork; and Tattenhall, Chester.

Births, Marriages, and Deaths.

BIRTHS.

BASHFORD.—On June 18th, at Downshire-hill, Hampstead, the wife of H. H. Bashford, M.D., of a daughter.
EDRIDGE.—On June 10th, to Dr. and Mrs. Ray Edridge, of Lynvale, St. Mark's-place, Bath, of a son.
HILL.—On June 18th, at Armaside, Purley, the wife of Lieutenant R. Gordon Hill, R.A.M.C., of a daughter.
HUGHES.—On June 9th, at Tudor House, High Barnet, the wife of Lieutenant G. R. Hughes, R.A.M.C., of a daughter.
MELLAND.—On June 13th, at Ladybarn-road, Fallowfield, Manchester, the wife of Dr. Charles H. Melland, Captain, R.A.M.C.(T.F.), of a daughter.
MUSGRAVE WOODMAN.—On June 10th, at Newhall street, Birmingham, the wife of Captain E. Musgrave Woodman, R.A.M.C., of a son.
STADDON.—On June 13th, at King's-road, Kingston-on-Thames, the wife of Captain Eric J. Staddon, R.A.M.C., of a son.

MARRIAGES.

HOBBS—CARGILL.—On Tuesday, June 12th, at St. Saviour's, Warwick-avenue, W., Surgeon Roland A. Hobbs, R.N., to Marjorie, elder daughter of Mr. Justice and Mrs. Cargill, of Kingston, Jamaica.
McLEAY—PEIRS.—On June 18th, at the Parish Church, Carshalton, Charles Wm. McLeay, M.D., W.A.M.S., to Olive, youngest daughter of Hugh Vaughan Peirs.

DEATHS.

FRERE.—Killed in action, "while attending the wounded near the front line," on June 9th, his 27th birthday, Captain Frederick John Henry Tobias (Eric) Frere, M.C., M.B., R.A.M.C., attached Lincoln Regiment.
HAIRSINE.—Killed in action, on June 9th, Captain Owen Hairsine, M.C., R.A.M.C., aged 26.
WALTERS.—On June 11th, at More Cottage, Reigate, John Walters, M.B., J.P., in his 81st year.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

BOOKS, ETC., RECEIVED.

ALLEN, GEORGE, AND UNWIN, London.
The Choice Before Us. By G. Lowes Dickinson. 6s. net.
BAILLIÈRE, TINDALL, AND COX, London.
Anatomy and Physiology of the Female Body. By H. E. J. Biss, M.D., D.P.H. Third edition. Plates by G. M. Dupuy, M.D. 4s. net.
Treatment of Infected Wounds. By A. Carrel and G. Dehelly. Translated by Herbert Child, formerly Surgeon, French Red Cross. With Introduction by Sir Anthony A. Bowlby, K.C.M.G., K.C.V.O., Surgeon-General, A.M.S. 5s. net.
Treatment of Tuberculosis by Means of Spengler's Immune Bodies (I.K. Therapy). By Niven Robertson, M.D. Edin., D.P.H. Cantab. 5s. net.
CHURCHILL, J. AND A., London.
Microbiology: A Text-book of Microörganisms, General and Applied. Edited by C. E. Marshall, Professor of Microbiology, Massachusetts Agriculture College. Second edition. 12s. 6d. net.
FROWDE, HENRY, AND HODDER AND STOUGHTON, London.
Dream Psychology. By M. Nicoll, Temporary Captain, R.A.M.C. 6s. net.
HEINEMANN, WM., London.
Manual of Practical X Ray Work. By David Arthur, M.D., D.P.H., and John Muir, B.Sc., M.B., Captain, R.A.M.C.T. Second and revised edition. 12s. 6d. net.
KIMPTON, HENRY, London.
Clinical Tuberculosis. By Francis Marion Pottenger, A.M., M.D., LL.D. With Chapter on Clinical Methods, by J. E. Pottenger, A.B., M.D. Vol. I., Pathology, Anatomy, &c. Vol. II., Complications and Treatment.
LEWIS, H. K., AND CO., London.
Congenital Word-Blindness. By James Hinshelwood, M.A., M.D., F.R.F.P.S. Glasg. 4s. net.
Dangers in Neck-Wear. By Walter G. Walford, M.D. 4s. 6d. net.
WRIGHT, JOHN, Bristol.
Medical Annual, 1917. 10s. net.
YALE UNIVERSITY PRESS, New Haven, Conn., and New York City.
Growth of Medicine from Earliest Times to 1800. By Albert H. Buck, B.A., M.D. $5 net.

Notes, Short Comments, and Answers to Correspondents.

THE DISPOSAL OF THE DEAD.

THE manner of burial or disposal of the dead human body is a subject of perennial interest to the public at large, to each individual, and to the sanitary authorities. The Burial Act of 1855 enacts that no burial shall take place within 100 yards of a dwelling-house, and this decision is undoubtedly for sanitary reasons. It is necessarily affected by the kind of coffin in which the body is buried. Economy in burials, as in other things affecting private affairs, is now the order of the day. The cost of funerals and coffins has often been entirely out of proportion to the status of the deceased and absorbing most of the insurance money. Transporting bodies long distances is often a matter of sentiment and must to-day be discouraged.

Apart from ordinary coffins, there have been the simple winding-sheet or shroud, a blanket, papier maché, bark, the hollowed trunk of a tree, or a wicker basket with charcoal. Limestone, other kinds of stone, marble, and iron have all been used for coffins, and there is a beautiful alabaster sarcophagus of Seti, father of Rameses II., amongst the art treasures in Sir John Soane's Museum in Lincoln's Inn Fields. The coffin as a work of art has frequently appealed to oriental nations, who have often had them made perhaps years before death, a practice not unknown in European countries. Some old coffins were superbly enamelled and jewelled with fragments of precious stones and gilded with real gold. Sir Erasmus Wilson said that sometimes copper was fraudulently used instead of gold by the ancient Egyptian artists. Some years ago there was an attempt to introduce general burial of the body by pouring lime in the wooden coffin just before interment, but the idea did not recommend itself to æsthetic tastes or religious sentiment. As compromises wicker coffins or alternately coffins with thin glass lids, so that the weight of the earth should quickly smash in the lid and expedite the dissolution of the body, were recommended. The majority of people in this country, however, still adhere to lead, oak, and elm coffins with brass handles and nameplate. In the United States the glass lid coffin seems to be growing in vogue, although there a coffin is usually called a "casket." The casket may be made of bronze, cast metal, or steel, and claims to protect the bodies "from the hideous violations of the earth."

The disposal of the bodies of certain of the American Presidents forms an example which hygienists will regret. There is at Canton, Ohio, a McKinley monument, and in this tomb lie the remains of President McKinley and his wife in Springfield metallic caskets of bronze. These caskets were patented in the United States in 1898, and are claimed to be "the most perfect burial receptacle known." The adherents of burial reform who advocate that dissolution should take place as rapidly as possible and that no built graves should be used will hardly be likely to agree to this claim. President Garfield was buried in a bronze casket in 1881, and President Grant, who died in 1885, was buried in a casket of Bessemer steel with oval top, secured by rivets put in red hot. It is 8 feet long, 3 feet 6 inches high, and 35 inches wide, painted with waterproof paint, and stained mahogany colour. Its gross weight is 3800 lb. It has silver mountings and a gold plate engraved with his name, "U. S. Grant." It is claimed to be burglar-, air- and fire-proof. President Lincoln was first buried in a red cedar coffin, but an attempt was made to steal the body and it is now covered by a huge monument. The large number of men killed in the present war has caused a reversion to primitive methods of burial—nature's barrows and tumuli or crevasses which call for no coffins.

INDIAN AMBULANCE MANUALS.

FROM Messrs. Vithal Asharam Thakkar, Shiyapura-Baroda, we have received a copy of "Prathmic Madad Karanaraone Shikshan," a translation of Colonel R. J. Blackham's little book on Indian ambulance training, which has been made in Gujerati by Dr. Dhanjibhai Hormasji Mehta, lecturer and examiner to the St. John Ambulance Association, and jail superintendent at Baroda. The price is 1 rupee. The author, who has done his work in a very careful and painstaking manner, is an enthusiastic ambulance worker, and has translated for the use of Hindoos and others several ambulance and first-aid books, including "Tropical Hygiene," by Sir Pardey Lukis and Colonel Blackham. The translation of "Indian Ambulance Training" should prove useful to ambulance centres in Gujerati and Kathwiawar, especially in the formation of classes for instruction in

receiving the wounded from the Front. Messrs. Claridge and Co., Caxton House, Bombay, publish the original edition of "Indian Ambulance Training" in English, price 12 annas. This firm has also recently issued new editions of other ambulance books by Colonel Blackham—namely, "The Indian Manual of First Aid," fifteenth edition, price 1 rupee, and "A Primer of Tropical Hygiene," third edition, price 12 annas.

BANTING AND *PUNCH*.

THE aurist of distinction who first gave William Banting the hints as to diet which reduced his weight by two and a half stone[1] was Mr. William Harvey, of Soho-square. Writing to his brother Tom in 1863, William describes him as "oldish," but "A 1." The letter, with others, formed part of the grangerised "Comments on Corpulency [and] Lineaments of Leanness," by W. Wadd, surgeon extraordinary to George IV., which was knocked down for £40 at the recent Broadley book-sale at Messrs. Hodgson's. The book should have gone to a large medical library. William Banting was an unconscious humorist and the cause of wit in others. He refers to his obesity in his quaint pamphlet as "the parasite of barnacles on a ship. If it did not destroy the structure, it obstructed its fair, comfortable progress in the path of life."

Punch began on "Banting" in 1864. According to his nautical metaphor, Mr. Banting had been in dock 20 times, but had effected no repairs till he came under Mr. William Harvey, F.R.C.S. *Punch* sings as follows:—

> Some glutton has stated that brave Mr. Banting
> Himself has succumbed to the system he taught.
> 'Tis false, and he lives, neither puffing nor panting,
> But down to a hundred and fifty pounds brought.
>
> He's done it, and so may each overfed nigger
> Who'll simply adopt resolution severe
> To avoid, if he wouldn't grow bigger and b'gger,
> All bread, butter, sugar, milk, taters, and beer.
>
> Take a fresh lease of life and commence a new era,
> Mr. Banting's adv ce makes one long to begin—
> "Drink claret and sherry, good grog, and Madeira,
> Take four meals a day and—grow gracefully thin."

Such is "The Banting Code." On another page we have "The Banting Restaurant Joint Stock Company (Limited)."

> "This will devote its earnest attention to the preparation of viands which, whilst excluding, as much as possible, saccharine, farinaceous, and oleaginous matters, shall nevertheless administer, in the highest degree compatible with the absence of those savoury substances, to the pleasures of the palate."

The humour of mere corpulence abounds in the *Punch* of 1864–65, but obesity is apparently always regarded as a result of over-eating; pathological obesity, such as Daniel Lambert suffered from, is not recognised.

INTRUDING ANTS.

To the Editor of THE LANCET.

SIR,—Recently I have heard many complaints concerning ants (sometimes called emmets, pismires, &c., in the country) getting into larders, pantries, and food-cupboards. Perhaps the prolonged drought has left them free to multiply. Latterly I was puzzled to know how ants got into the house, but accidentally discovered one means. The portable dust-bin used to stand on concrete, but some weeks ago was placed on earth in the corner of the garden. The ants had made a "hill" underneath it, and when the dustbin was carried through the house to the front roadway for the periodical removal by dustmen, the ants clung unseen to the bottom of the dustbin, which, being heavy, was put down half-way through the house. Then some of the ants scampered around unseen inside the house. They find their way without much delay to the food-cupboards and pantries.

I have read of mixtures of paraffin and benzoline in equal parts, and of a mixture of snuff and powdered black hellebore. I know that many people pour plain paraffin on the tracks outside the house, lay about sticks of firewood soaked in creosote and paint places with carbolic acid inside the house, but these methods are not pleasant to use near food. Perhaps there are other methods. The above are at least 30 years old. Of course I know one can always kill them individually, but it is tedious work.

I am, Sir, yours faithfully,

London, June 18th, 1917. R. T.

*** The following are popular remedies: Powdered cloves with borax (oil of cloves thinned with methylated spirit could be worked up with the borax), or camphor 1oz. with borax 1 lb. Turpentine is a well-known and efficacious remedy, but not pleasant for food-cupboards.—ED. L.

COMMUNICATIONS not noticed in our present issue will receive attention in our next.

[1] THE LANCET, June 9th, 1917, p. 898.

Medical Diary for the ensuing Week.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East.

TUESDAY.—5 P.M., Croonian Lectures:—Lieut. Col. J. G. Adami, A.D.M.S.: Adaptation and Disease. (Lectures IV.)

POST GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.

TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.

FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

NORTH EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY.—Clinics:—10.30 A.M., Surgical Out-patients (Mr. E. Gillespie). 2.30 P.M., Medical Out-patients (Dr. T. R. Whipham): Gynæcological Out-patients (Dr. Banister). 3 P.M., Medical In-patients (Dr. R. M. Leslie).

TUESDAY.—2.30 P.M., Surgical Operations (Mr. Carson). Clinics:—Medical Out-patients (Dr. A. G. Auld); Surgical Out-patients (Mr. Howell Evans); Nose, Throat, and Ear Out-patients (Mr. C. H. Hayton). Radiography (Dr. Metcalfe). 3.30 P.M., Medical In-patients (Dr. A. J. Whiting).

WEDNESDAY.—Clinics:—2.30 P.M., Throat Operations (Mr. C. H. Hayton). Children Out-patients (Dr. T. R. Whipham); Eye Out-patients (Mr. R. P. Brooks); Skin Out-patients (Dr. H. W. Barber). 5.30 P.M., Eye Operations (Mr. R. P. Brooks).

THURSDAY.—2.30 P.M., Gynæcological Operations (Dr. A. E. Giles). Clinics:—Medical Out-patients (Dr. A. J. Whiting); Surgical Out-patients (Mr. Carson); Radiography (Dr. Metcalfe). 3 P.M., Medical In-patients (Dr. R. M. Leslie).

FRIDAY.—2.30 P.M., Surgical Operations (Mr. Howell Evans). Clinics:—Medical Out-patients (Dr. A. G. Auld); Surgical Out-patients (Mr. E. Gillespie); Eye Out-patients (Mr. R. P. Brooks).

THE THROAT HOSPITAL, Golden-square, W.

MONDAY.—5.15 P.M., Special Demonstration of Selected Cases.
THURSDAY.—5.15 P.M., Clinical Lecture.

ROYAL INSTITUTE OF PUBLIC HEALTH, Lecture Hall of the Institute, 37, Russell-square, W.C. 1.

Course of Lectures and Discussions on Public Health Problems under War and After-war Conditions:—

WEDNESDAY.—4 P.M., Lecture XI.:—Major Sir William Milligan, M.D.: The Value and Importance of Physical Exercises from a National Standpoint. Followed by a discussion.

The following journals, magazines, &c. have been received:—Canadian Journal of Medicine and Surgery, Journal of Laryngology, Rhinology, and Otology, Revue de Chirurgie, Saint Paul Medical Journal, Journal of the Royal Sanitary Institute, Indian Medical Gazette, Journal of Nervous and Mental Disease, British Dental Journal.

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IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

Letters, whether intended for insertion or for private information, must be authenticated by the names and addresses of their writers—not necessarily for publication.

We cannot prescribe or recommend practitioners.

Local papers containing reports or news paragraphs should be marked and addressed "To the Sub-Editor."

Letters relating to the publication, sale, and advertising departments of THE LANCET should be addressed "To the Manager."

We cannot undertake to return MSS. not used.

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INCREASED war expenses and cost of production necessitate an increase of the price of THE LANCET. Commencing with the new year, the price was raised to 8*d*. The rates of subscription remain as revised in October.

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METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, June 20th, 1917.

Date.	Rainfall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Temp.	Wet Bulb.	Dry Bulb.	Remarks.
June 14	...	127	81	62	62	65	Cloudy
,, 15	...	123	84	59	61	69	Fine
,, 16	...	116	84	64	65	75	Fine
,, 17	0·23	126	88	69	74	80	Fine
,, 18	...	128	86	64	69	76	Fine
,, 19	0·39	116	74	63	57	69	Cloudy
,, 20	0·05	123	76	59	62	67	Cloudy

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

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